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ULTRASTRUCTURAL CHANGES IN CENTRAL NERVOUS SYSTEM CELLS INDUCED BY ARBOVIRUSES

Moscow ARKHIV PATOLOGII in Russian Vol 43, No 9, Sep 81 (manuscript received 2 Apr 80) pp 72-78

[Article by B. A. Yerman and N. Ya. Pashnina (Sverdlovsk), Laboratory of Pathological Anatomy and Pathogenesis of Viral Infections (headed by Prof B. A. Yerman), Sverdlovsk Scientific Research Institute of Viral Infections]

[Text] Key words: central nervous system, arboviruses, electron microscopy.

A considerable number of works has been published on electron microscopy of arboviral infections. Research conducted with tissue culture cells and the relevant viruses was systematized in recently published monographs [1, 2, 9]. However, there was no generalization of studies conducted with experimental animals, and this prompted us to write this article.

According to the present classification of viruses, arboviruses are referable to the family Togaviridae, which consists of the genera Alphavirus--previously known as group A arboviruses--and Flavivirus, which includes group B arboviruses [15]. Mature arboviral virions in the nervous system of laboratory animals are round and consist of an electron-dense nucleoid situated in the center and an external clear protein shell--the capsid. As a rule the protein shell is invested externally in a membrane. The Flavivirus virions are about 40 nm in diameter and Alphavirus about 56 nm. Electron microscopy revealed the routes of penetration and dissemination of viruses in the animal central nervous system (CNS), sites of localization and reproduction of viruses, nature and specificity of ultrastructural changes in cells under the influence of infection, nature of inclusions, etc.

Soviet and foreign authors [3, 10, 12-14, 17, 24-27] have submitted the virus of tick-borne spring and summer encephalitis to electron microscopy. Experiments on mice revealed that the main and, apparently, only site of reproduction of tick-borne encephalitis virus in the CNS is in neurons of the brain and spinal cord, where the virus is localized in severely dilated canals, cisternae and vesicles of the endoplasmic reticulum, lamellar complex, in dendrites, axons and synapses. The quantity of virions per cell ranges from isolated particles to massive accumulations. The site of nucleoid synthesis is probably the cytoplasmic matrix, where nucleoid-like elements are occasionally encountered [3].

The ultrastructural changes in infected cells are characterized by reduction and breakdown of rough endoplasmic reticulum, with disappearance of ribosomes and polysomes. The canals and cisternae of the endoplasmic reticulum are markedly dilated and circumscribed by smooth membranes, and they contain many mature virions. In addition, intensive proliferation of smooth membranes is observed in the cytoplasmic matrix. They extend in the form of loops and fascicles over a considerable distance and form numerous vesicles, in which virions are localized. In some places, the membranes form multilayer concentric inclusions. Not infrequently, spaces are formed in the perikaryon that contain many vesicles of diverse shape and size. Golgi's lamellar complex is hypertrophied, with severely dilated cisternae and vacuolar spaces containing virions.

At the late stages of infection, there is breakdown of mitochondria, nuclear and cytoplasmic membranes of neurons with migration of destructively altered organelles and virus into the intercellular space. Dissolution and breakdown of glial cells, amyelinated and myelinated fibers, inflammatory infiltrate cells and vascular walls are observed around the destroyed neurons, which leads to total disintegration of tissue at the site of the lesion. Viral reproduction has not yet been proven in cells of the neuroglia, inflammatory infiltrate and vascular endothelium, although a few virions have occasionally been encountered in astrocytes and capillary walls [12, 14]. It was recently established that tick-borne encephalitis virus can reproduce in extraneural tissues also (for example, in striate muscle) [23]. This is apparently important to the pathogenesis of infection at the early stages of an infectious process.

The virus spreads over the nervous system through intercellular and perivascular spaces, where significant collections of the virus are consistently observed, and apparently through neuronal processes as well. The virus penetrates into the nervous system through capillary walls, in the endothelium and basilar membrane of which virions are encountered.

Electron microscopic studies of experimental encephalitis induced by viruses of the tick-borne encephalitis complex (TEC)--Langat viruses, Omsk hemorrhagic fever (OHF) viruses, Powassan viruses and, finally, Loupingill virus [44]--revealed, in addition to the similar changes inherent for the entire group of TEC viruses, some substantial distinctions of each pathogen individually. Thus, it was established that astrocytes and neurons are the site of reproduction of Langat virus [12, 28, 29]. The virus has been demonstrated in the bodies and processes of astrocytes and neurons. The most typical changes in the cells are dilatation of reservoirs of endoplasmic reticulum, proliferation of membranes of the endoplasmic network and lamellar complex with subsequent grouping in the form of trabeculae, thickening and consolidation of membranes, appearance of numerous oval electron-clear vacuole-corpuscles about 60-80 nm in diameter, as well as mature virions. Many dense ribosome-like corpuscles appear in the cytoplasmic reticulum, which adhere to the outer surface of the membranes. It is assumed that these ribosome-like corpuscles are actually nucleoid centers, from which the viral nucleoid is subsequently formed. The virus has been demonstrated in intercellular and perivascular spaces.

OHF virus has been found in neurons and oligodendrocytes [18-21, 41, 42]. The ultrastructure of the endoplasmic reticulum changes only at the sites of viral localization. In other areas of the cell, there is preservation of normal arrangement of Nissl substance structures. At the sites of viral localization, there are convoluted membranes notable for their large thickness and higher electron density. The altered membranes are continuously linked to membranes of the smooth and rough endoplasmic reticulum and are a continuation of the latter. In the loops formed by intertwining of such membranes there are collections of fine vesicles with viral particles. The virions and virus-containing vesicles are also observed in reservoirs of the rough and smooth endoplasmic reticulum and lamellar complex. The microvesicles are diverse in size, shape and density of substance in them. Small accumulations of virus are also present in spherical structures invested in a single smooth membrane of the cell surface. Some particles covering the rough membranes are notable for their larger size and greater electron density than the ribosomes of noninfected cells. The virus spreads over the nervous system through intercellular and perivascular spaces, where it is consistently demonstrable in the form of chains and collections with crystal-like assembly of particles.

Electron microscopic studies of Powassan virus [4-8, 21, 22, 33] revealed that viral reproduction occurs chiefly in neurons and their dendrites. Isolated viral particles and small collections thereof are also observed in astrocytes and oligodendrocytes, but sites of viral reproduction are very rarely encountered in these cells. The viral particles are localized chiefly in the lumen of the altered canals of the granular endoplasmic reticulum, vacuoles of the lamellar complex, perinuclear space, as well as vacuoles and vesicles invested in a membrane. It is extremely rare to encounter virions in the hyaloplasm. In macroglial and microglial cells, capillary endothelium and cellular elements of blood (neutrophil leukocytes, lymphocytes), the virions are localized primarily in lysosomes and phagosomes. Occasionally, viral particles are encountered in the cytoplasm of myelin-forming cells, cytoplasm of the axis cylinder, within the mesaxon and between the walls of the myelin sheath. Large collections of viral particles are encountered in intercellular spaces.

In infected neurons, the structure of Nissl's substance is the first to be impaired. The membranes of the granular endoplasmic reticulum become thicker and form accumulations. These collections may be linear, arched or annular in shape, with concentric arrangement of layers. There is a drastic decrease in quantity of polysomes, as well as free and membrane-bound ribosomes. Ribosome-like structures appear on the membranes of granular endoplasmic reticulum, which differ from ordinary ribosomes in that they are more electron dense and larger (up to 35 nm in diameter). Along with virions, there is appearance in the lumen of the canals of granular endoplasmic reticulum of distinctive round or oval vesicles with a smooth outline, 60-200 nm in diameter, that are closely connected to the canal membranes. In some places, the blebs form racemose [bunched] accumulations. The contents of the blebs have low electron density. There is hypertrophy and hyperplasia of the lamellar complex. There are nonspecific destructive changes in the mitochondria. Lipid inclusions appear in the cytoplasm and nucleus.

It can be assumed that viral synthesis occurs on the altered membranes of the granular endoplasmic reticulum and in vesicles. Powassan virus failed to demonstrate a stage of formation of virion precursors in hyaloplasm with subsequent migration of nucleoid into the canal lumen with an area of adhering membrane. Powassan virus spreads in the nervous system over cellular and synaptic contacts, intercellular fissures and hematogenically. The viruses are probably released from cells through the endoplasmic reticulum canals.

Typical ultrastructural changes induced by arboviruses in mouse CNS [Part 1]

Virus	Cells in which virus reproduces	Severity of changes in cells	Smooth membrane hyperplasia	Consolidation, thickening of membranes	Vacuolization vesiculization	Unusual structures in cell cytoplasm
Tick-borne encephalitis	Neurons	Severe destruction with breakdown of cells and surrounding tissue	Marked	None observed	Moderate	Circular multilayer structures
Langat	Neurons, astrocytes		"	Observed	"	Vacuole-corpuscles 68-80 nm in diameter
OHF	Neurons, oligodendrocytes	Local changes	Insignificant	Very marked	"	Microvesicles, convoluted, thickened membranes
Powassan	Neurons, astrocytes, oligodendrocytes	Moderate dystrophic and necrobiotic changes	"	" "	"	Vesicles 60-200 nm in diameter, collections of thickened membranes, linear & annular structures
Japanese encephalitis	Neurons	Cellular vacuolization, pyknosis of nuclei	None seen	None observed	Very marked	Multivesicular corpuscles
West Nile	"					Corpuscles not invested in membranes, similar to mitochondria in size
St. Louis	"	Breakdown of cells	Very marked	None observed	Insignif.	Membranous masses filling entire cytoplasm
Yellow fever	"	" " "	Marked	" "	Very marked	Oval blebs, vesicles with thick walls, racemose collections of short tubules
Semliki forest	Neurons, glial cells	Well-preserved cells	None seen	" "	Moderate	Tubular structures, types 1 and 2 cytoplasmic vacuoles

Typical ultrastructural changes induced by arboviruses in mouse CNS [Part 2]

Virus	Nucleoid in hyaloplasm	Authors
Tick-borne encephalitis	Seldom encountered	Blinzinger [27], L. G. Tulakina [14], B. A. Yerman et al. [3]
Langat	None observed	Boulton & Webb [28], T. I. Tikhomirova et al. [10-12]
OHF	" "	N. M. Shestopalova et al. [20-22]
Powassan	" "	N. M. Shestopalova et al. [21], S. G. Sobolev et al. [5], S. G. Sobolev [8]
Japanese encephalitis	" "	Oyanagi et al. [38]
West Nile		T. I. Tikhomirova [12], Tamalet et al. [45]
St. Louis	" "	Murphy et al. [34]
Yellow fever	" "	Blinzinger [27]
Semliki forest	Consistently seen	Murphy et al. [35], Grimley et al. [32], Pathak et al. [39, 40]

Analysis of changes in nervous system cells under the influence of TEC viruses indicates that the changes elicited by different viruses are similar in many respects. At the same time, it was possible to detect distinctions for each pathogen that are not strictly specific, but typical (see Table). Thus, tick-borne encephalitis virus reproduces and is localized chiefly in neurons, whereas the other viruses of the tick-borne encephalitis complex can multiply and be localized in macroglial cells (astrocytes, oligodendrocytes), in addition to nerve cells. Tick-borne encephalitis virus induces the most severe destructive changes in neurons, with breakdown thereof and dissolution of surrounding tissue. The other TEC viruses do not elicit such severe changes in cells. The changes associated with OHF are local in nature. With infection caused by tick-borne encephalitis virus, one observes hyperplasia of smooth membranes, whereas with infection caused by OHF and Powassan viruses there is grouping, thickening and consolidation of prior membranes of endoplasmic reticulum, with appearance on their surface of large ribosome-like electron-dense particles. With tick-borne encephalitis there is massive accumulation of virions in cells, which is not observed with infections caused by other TEC pathogens.

Electron microscopic studies of the nervous system of mice infected with Japanese encephalitis virus [37, 38, 43] revealed that viral reproduction occurs in the neurons of the cerebral cortex, thalamus, cerebellum and spinal cord. No virus was demonstrated in the cells of the macroglia and microglia or inflammatory infiltrate in the endothelium of capillaries and epithelium of vascular plexi. In sick animals, up to 70-80% of all cortical neurons and nerve cells of the anterior cornua of the thoracic spinal cord contain the virus. At the early stages of infection, viral particles first appear in vesicles and vacuoles of the lamellar complex and perinuclear elements of the smooth endoplasmic reticulum. Somewhat later, the virus appears in the rough endoplasmic reticulum, where three types of arrangement of particles were demonstrated. With the first type, isolated particles are demonstrable in vesicles; with the second type, the virions are localized within the tubular endoplasmic reticulum, where it forms groups in the shape of columns; with the third type, a small quantity of particles is scattered in disorder in the vacuoles. At the late stages of infection, the viral particles are situated in vesicles and vacuoles scattered over the entire cytoplasm. No virus was found in the cytoplasmic matrix or cell nuclei. Viral reproduction is associated with depletion of cytoplasmic ribosomes and polysomes, decrease in granular endoplasmic reticulum, intensive increase in quantity of vesicles and vacuoles in cytoplasm, appearance of numerous multivesicular corpuscles. The neuronal nuclei are shriveled and serrated. No virions were demonstrated in the eosinophil inclusions, which are observed in the nuclei of epithelial cells of vascular plexi in infected animals. It can be assumed that these inclusions are the products of dystrophic intranuclear changes. Lesions induced by Japanese encephalitis virus are characterized by appearance in the cytoplasm of infected cells of an enormous quantity of vesicles and vacuoles, without marked proliferation, thickening and grouping of smooth membranes, absence of ribosome-like structures on the membranes, presence of virus only in neurons and absence of breakdown of nerve cells as observed with tick-borne encephalitis (see Table).

Electron microscopic studies of the CNS of mice infected with West Nile [11, 45] and St. Louis [34] viruses, which are referable to the Japanese encephalitis complex, revealed the following. West Nile virus was demonstrated in the bodies of cortical neurons, as well as myelinated axons. Viral particles are localized in the reservoirs of endoplasmic reticulum and lamellar complex. The morphological distinction of intracellular infection when animals are infected with West Nile virus is that the granular cytoplasmic regions contain corpuscles of moderate electron density that are not invested in a membrane and comparable in size to mitochondria.

St. Louis encephalitis virus strikes most neurons of the mouse brain. There is hyperplasia of membranes of the endoplasmic reticulum in infected cells, as well as lamellar complex with de novo formation of smooth membranes occupying most of the cell cytoplasm. The newly formed membranes are arranged either in disorder or in a certain order. The disorganized, twisted membrane masses are inseparable from the membranes of the endoplasmic reticulum and are a continuation thereof. In some places, the membranes form numerous snarled, interconnected tubules. On the whole, the convoluted membranous masses form inclusions that fill most of the cell cytoplasm. In addition, there are cylindrical and round membranous structures filled with electron-dense material in the cytoplasm and cisternae of the endoplasmic reticulum. There are electron-dense particles 25 nm in size, which can be readily distinguished from ribosomes, on the external surface of cytoplasmic membranes.

Virions are localized in the cisternae of the endoplasmic reticulum, lamellar complex and cavities of newly formed membranes. Tadpole-like particles of an undetermined nature are also encountered in the cisternae. The virus is released from the cell when the neuron breaks down. Large quantities of virions are present in the intercellular spaces, together with remnants of the membranes of destroyed cells. Thus, the hyperproduction of membranous structures in infected neurons is the most typical sign of infection caused by St. Louis encephalitis virus.

Electron microscopic studies of the CNS of mice infected with yellow fever virus revealed that it reproduces only in nerve cells [27, 30]. Intensive formation of vesicular and vacuolar elements is observed in infected cells. However, unlike tick-borne encephalitis, the formed blebs are not circular; rather, they are oval or elongated. In addition, unusual annular structures are encountered in some places, whose size is similar to that of vesicles, but they have thick, electron-dense walls. In some cases, there are distinctive cytoplasmic bunches of short tubules, which are connected to the newly formed vesicular elements and viral particles. There is distinct disappearance of ribosomes and polysomes from cells. The other changes in the cells are analogous to those observed with tick-borne encephalitis. Yellow fever virus is localized in the canals and cisternae of the endoplasmic reticulum, lamellar complex and newly formed vesicles and vacuoles. The structure of this virus is the same as that of the other arboviruses. In a previous study, Bergold and Weibel observed yellow fever virus only in astrocytes [24]. However, these findings were not corroborated subsequently [27].

There is also information in the literature about ultrastructural changes in the CNS of mice infected with Alphaviruses (group A arboviruses), for example, Semliki forest [31, 32, 35, 39, 40, 46] and equine encephalomyelitis [16, 36] viruses.

It has been established that Semliki forest virus multiplies in neurons and neuroglial cells. The cytoplasmic matrix of cells is the site of viral synthesis, and considerable collections of viral nucleoids are observed there. The nucleoids are round, homogeneous, electron-dense and have a 28-nm diameter. The nucleoids are discretely arranged or in the form of pseudocrystals; they also form groups on the membranes of the endoplasmic reticulum and cell membrane. Gemmation of numerous nucleoids is observed in the cisternae of the endoplasmic reticulum and intercellular spaces, where mature virions with a protein shell accumulate. The nucleoid becomes invested in a protein shell as it traverses the cell membranes. A number of new structures are found in infected cells that are not inherent in normal cells. We refer, first of all, to numerous and diverse tubular elements arranged freely in the cytoplasmic matrix. In some places in the cytoplasmic matrix, there are distinctive large vacuoles, invested in a membrane, which contain in their lumen some fine vesicles or membranous blebs whose size is close to that of the viral particles. These are the so-called type 1 cytoplasmic vacuoles (CPV-1). Some authors [40] observed type 2 CPV in infected cells. CPV-2 present diverse morphology: a vacuole with thick membranous wall on which there are ribosome-like nucleoid centers--particles 20-30 nm in diameter; a vacuole containing a thick-walled canal 50-60 nm in diameter with nucleoid centers; the canal is formed as a result of invagination of part of the vacuolar wall into its lumen; a vacuole filled with mature viral particles. The authors believe that CPV-2 is the site of virus synthesis, where the virus undergoes all stages of morphogenesis, from formation of the nucleoid center to mature virion. The authors also assume that with the help of CPV-2 the virus penetrates into the cell and is released from it. CPV-2 is localized both in the cytoplasmic matrix and under the cytoplasmic membrane, merging with it in some places in the form of a pinocytotic bleb.

Cribriform tubular membranes (microtubular reticulum) arranged around the nucleus constitute another type of membrane structure frequently appearing in the cytoplasmic matrix. Typically enough, the ultrastructures of infected cells are generally well-preserved. Only some decrease in rough endoplasmic reticulum and free ribosomes, with moderate vacuolization of cytoplasm, are observed. In addition to neurons and glial cells, numerous viral particles of Semliki forest virus are seen in the lumen of blood vessels, endothelial cells, basement membrane of capillaries, perivascular and intercellular spaces. The virus spreads in the nervous system over intercellular spaces, as well as hematogenically.

Studies of ultrastructural changes in the brain of mice and Syrian hamsters caused by Venezuela and eastern encephalomyelitis viruses revealed that reproduction of the virus occurs in neurons of Ammon's horn, Purkinje cells and glial cells. It must be noted that the largest quantity of viral particles is found in glial cells. Nucleoids and mature viral particles are freely arranged in the cytoplasmic matrix, on the membranes of cytovacuoles and in vacuoles. The process of viral reproduction is associated with development of focal dystrophic and destructive changes in infected cells.

Conclusion

Neurons are the chief site of viral reproduction in the nervous system. However, some viruses can also multiply in glial cells. Viral reproduction in cells is associated with varying severity of lesions ranging from severe necrosis with breakdown of the cell and structures surrounding it in the case of tick-borne encephalitis to mild changes in the cells with infection caused by Semliki forest virus. Arboviruses elicit changes in the animal CNS that are similar in many respects and typical for this group of viruses. Reproduction of viruses in nerve and glial cells is associated with disappearance of rough endoplasmic reticulum, cellular ribosomes and polysomes. At the same time, there is hyperplasia and hypertrophy of smooth membranes of the lamellar complex and endoplasmic reticulum with dilatation of cisternae and canals. The smooth membranes are grouped into clusters [fascicles] and layered structures. Large ribosome-like particles, so-called nucleoid centers, are often situated on the membranes. Numerous and diverse vesicles appear in the cytoplasmic matrix and cisternae of endoplasmic reticulum. Mature virions are localized in the canals and cisternae of the endoplasmic reticulum, lamellar complex, in vesicles and vacuoles, as well as in intercellular and perivascular spaces. Alphavirus nucleoids are situated in the cytoplasmic matrix, which is rarely observed with Flavivirus infection. Along with similar changes in cells, there are also some changes that are not strictly specific but typical for each pathogen. They vary in quantity and quality (degree of membrane hyperplasia, membrane structure, intensity of vacuolization, outcome, etc.). Viruses spread in the CNS through neuronal processes, intercellular, perivascular spaces and hematogenically.

BIBLIOGRAPHY

1. Avakyan, A. A. and Bykovskiy, A. F., "Atlas of Anatomy and Ontogenesis of Human and Animal Viruses," Moscow, 1970.

2. Bykovskiy, A. F., Yershov, F. I., Karmysheva, V. Ya., et al., "Atlas of Viral Cytopathology," Moscow, 1975.

3. Yerman, B. A., Tulakina, L. G., Bronitskaya, Ye. Yu., et al., ARKH. PAT., No 4, 1978, pp 30-38.

4. Sobolev, S. G., in "Czechoslovak Conference on Electron Microscopy Held in Prague. 15th. Proceedings," Prague, Vol A, 1977, pp 313-314.

5. Sobolev, S. G., Shestopalova, N. M., Linev, M. B., et al., VOPR. VIRUSOL., No 3, 1978, pp 359-366.

6. Sobolev, S. G. and Shestopalova, N. M., ARKH. PAT., No 3, 1978, pp 20-26.

7. Sobolev, S. G., in "Transkontinental'nyye svyazi pereletnykh ptits i ikh rol' v rasprostranenii arbovirusov" [Transcontinental Relations of Migratory Birds and Their Role in Spread of Arboviruses], Novosibirsk, 1978, pp 243-247.

8. Idem, "Electron Microscopic Study of Reproduction of Powassan Virus in the Central Nervous System," author abstract of candidatorial dissertation, Moscow, 1979.

9. Solov'yev, V. D., Khesin, Ya. Ye. and Bykovskiy, A. F., "Essays on Viral Cytopathology," Moscow, 1979.

10. Tikhomirova, T. I., Frolova, M. P., Karpovich, L. G., et al., in "Aktual'nyye problemy virusologii i profilaktiki virusnykh zabolevaniy" [Pressing Problems of Virology and Prevention of Viral Diseases], Moscow, 1972, pp 138-139.

11. Tikhomirova, T. I., Kiseleva, L. L., Barer, F. S., et al., Ibid, pp 168-169.

12. Tikhomirova, T. I., Karpovich, L. G., Frolova, M. P., et al., TRUDY IN-TA POLIOMIYELITA I VIRUSNYKH ENTSEFALITOV AMN SSSR, Vol 22, No 2, 1974, pp 98-106.

13. Tulakina, L. G., Subbotina, L. S., Surin, I. P., et al., in "Diagnostika i profilaktika virusnykh infektsiy" [Diagnosis and Prevention of Viral Infections], Sverdlovsk, 1974, pp 192-199.

14. Tulakina, L. G., "Pathomorphological Changes in the Central Nervous System of Animals Infected by Poliomyelitis and Tick-Borne Encephalitis Viruses," author abstract of candidatorial dissertation, Moscow, 1978.

15. Fenner, F., MacOslen, B., Mims, S., et al., "Biological of Viral Animals," Moscow, Vol 1, 1977.

16. Chernyavskiy, Yu. N., "Comparative Electron Microscopic Study of Pathogenic and Attenuated Variants of Venezuela and Eastern Encephalomyelitis Viruses," author abstract of candidatorial dissertation, Tomsk, 1975.

17. Shestopalova, N. M., Reyngol'd, V. N., Tikhomirova, T. I., et al., in "Konferentsiya po elektronnoy mikroskopii" [Conference on Electron Microscopy], Varna, 1971, pp 47-48.

18. Shestopalova, N. M., Reyngol'd, V. N., Gagarina, A. V., et al., in "Virusnyye gemorragicheskiye likhoradki" [Viral Hemorrhagic Fevers], Moscow, 1971, pp 445-457.

19. Shestopalova, N. M., Reyngol'd, V. N., Tikhomirova, N. M., et al., in "Voprosy meditsinskoy virusologii" [Problems of Medical Virology], Moscow, Pt 2, 1971, pp 71-72.

20. Shestopalova, N. M., Reyngol'd, V. N., Kharitonova, N. N., et al., in "Simpozium po izucheniyu transkontinental'nykh svyazey pereletnykh ptits i ikh rol' v rasprostranenii arbovirusov. Tezisy" [Summaries of Papers Delivered at Symposium on the Study of Transcontinental Relations of Migratory Birds and Their Role in the Spread of Arboviruses], Novosibirsk, 1976, p 82.

21. Shestopalova, N. M., Reyngol'd, V. N., and Sobolev, S. G., Ibid, p 81.

22. Shestopalova, N. M., Reyngol'd, V. N., Sobolev, S. G., et al., in "Transkontinental'nyye svyazi pereletnykh ptits i ikh rol' v rasprostranenii arbovirusov," Novosibirsk, 1978, pp 222-227.

23. Shestopalova, N. M., in "Vsesoyuznaya konf. po elektronnoy microskopii. 11-ya" [11th All-Union Conference on Electron Microscopy], Moscow, Vol 2, 1979, p 234.

24. Bergold, G. H. and Weibel, J., J. VIROL., Vol 17, 1962, pp 554-562.

25. Blinzinger, K. and Muller, W., DTSCH. Z. NERVENHEILK., Vol 197, 1970, pp 18-27.

26. Idem, ACTA NEUROPATH. (Berlin), Vol 17, 1971, pp 37-43.

27. Blinzinger, K., ANN. INST. PASTEUR, Vol 123, 1972, pp 497-519.

28. Boulton, P. S. and Webb, H. E., BRAIN, Vol 94, 1971, pp 411-418.

29. Dalton, S., ANN. INST. PASTEUR, Vol 123, 1972, pp 489-496.

30. David-West, T. S., Labzoffsky, N. A. and Hamvas, J. J., ARCH. GES. VIRUSFORSCH., Vol 36, 1972, pp 372-379.

31. Grimely, P. M. and Friedman, R. M., EXP. MOL. PATH., Vol 12, 1970, pp 1-13.

32. Grimley, P. M., Levin, J. G., Berezesky, J. K., et al., J. VIROL., Vol 10, 1972, pp 492-503.

33. Isachkova, L. M., Shestopalova, N. M., Frolova, M. P., et al., ACTA VIROL., Vol 23, 1979, pp 40-44.

34. Murphy, F. A., Harrison, A. K., Gary, G. W., et al., LAB. INVEST., Vol 19, 1968, pp 652-662.

35. Murphy, F. A., Harrison, A. K., and Collin, W. K., Ibid, Vol 22, 1970, pp 318-327.

36. Murphy, F. A., and Whitfield, S. G., EXP. MOL. PATH., Vol 13, 1970, pp 134-146.

37. Oyanagi, S., NEUROPATH. POL., Vol 4, 1966, pp 457-463.

38. Oyanagi, S., Ikuta, F., and Ross, E. R., ACTA NEUROPATH. (Berlin), Vol 13, 1969, pp 169-181.

39. Patnak, S. and Webb, H. E., J. NEUROL. SCI., Vol 23, 1974, pp 175-184.

40. Patnak, S., Webb, H. E., Oaten, S. W., et al., Ibid, Vol 28, 1976, pp 289-300.

41. Shestopalova, N. M., Reingold, V. N., Gagarina, A. V., et al., J. ULTRASTRUCT. RES., Vol 40, 1972, pp 458-469.

42. Schestopalova, N. M., Reingold, V. N., Gagarina, A. V., et al., in "Congres International de Microscopie Electronique, 7," Grenoble, 1970, pp 281-282.

43. Shirakawa, Y., J. KURUME MED. ASS., Vol 28, 1965, pp 1287-1303.

44. Smith, W. and Doherty, P. C., RES. VET. SCI., Vol 10, 1969, pp 479-480.

45. Tamalet, J., Toga, M., Chippaux-Hyppolite, C., et al., C. R. ACAD. SCI. (Paris, Ser. D), Vol 269, 1969, pp 668-671.

46. Zlotnik, J. and Harris, W. J., BRIT. J. EXP. PATH., Vol 51, 1970, pp 37-42.

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10,657
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EFFECT OF SOME ORGANOCHLORINE PESTICIDES ON CENTRAL NERVOUS SYSTEM FUNCTION

Kiev FIZIOLOGICHESKIY ZHURNAL in Russian Vol 27, No 4, Jul-Aug 81 (manuscript received 22 Apr 80) pp 557-560

YERSHOVA, L. K. and KHOMENKO, N. R., All-Union Institute of Hygiene and Toxicology of Pesticides, Polymers and Plastics

[Abstract] A study was made of the effects of polychloropinene (PCP) and polychlorocamphene (PCC) on 12 adult Belorussian breed chickens given 1/10 LD_{50} of each of these insecticides, with 5 chickens used as a control; observation period lasted 21-40 days, attention being given to behavior, appearance, feathers, visible mucosa, motor activity, appetite, reactions to external stimuli and weight changes, special attention being given to determination of the role of central nervous system dysfunction or peripheral disorders in the observed motor disturbances. EEG's were taken for determination of bioelectrical cortical processes and functional changes, as well as reaction to light flashes delivered at a frequency of 5.8 and 12 Hz. Both PCP and PCC given for 10 days had a neurotoxic effect on the chickens, and it was shown that drastic slowing of biopotentials of the sensorimotor and visual cortex, as well as inhibitory processes played a part in development of the toxic effects. Figures 2; references 4 (Russian).
[27-10,657]

UDC 616.092.9

POSSIBLE MECHANISM FOR RESISTANCE OF LINE C57B1/6 MICE TO MIXED INFECTION OF MYCOPLASMA ARTHRITIDIS AND RAUSCHER LEUCOSIS VIRUS

Kiev MIKROBIOLOGICHESKIY ZHURNAL in Russian Vol 43, No 2, Mar-Apr 81 (manuscript received 3 Apr 80) pp 199-202

SANIN, A. V., RAKOVSKAYA, I. V. and KHOROBRYKH, V. V., Institute of Epidemiology and Microbiology imeni N. F. Gamaleya, USSR Academy of Medical Sciences, Moscow

[Abstract] In contrast to hybrid mice (C57B1/6 x A/Sn F_1), the parent strain C57B1/6 is resistant to a mixed infection of Mycoplasma arthritidis and Rauscher virus. This was demonstrated eight months and one year after infection, at which time the spleen weight of 40 experimental mice did not differ from that of 75 controls. In addition, mice were infected four hours and three days after sublethal irradiation and examined for endocolonization in the spleen nine days later. No increase in the number of endocolonies was found. The difference between the parent and the first filial generation reflects a difference in the degree of genetically-caused resistance to the virus. In the hybrid mice, the mycoplasma may activate primitive erythroid precursor cells, increasing the number and/or sensitivity of the cells to the virus. In the parent, the hemopoietic cells may be inaccessible to the mycoplasma particles, due to receptor masking, configuration at the Fv-2 allele or action of another gene. References 15: 7 Russian, 8 Western.
[315-12126]

UDC 616.98:578.833.27]-053.2-085.371:578.833.27]-036.8-078.73

IMMUNOLOGICAL CHARACTERISTICS OF HUMAN VACCINATION AGAINST TICK-BORNE ENCEPHALITIS WITH INACTIVATED PREPARATIONS HAVING VARIOUS CONCENTRATIONS OF VIRUS ANTIGEN

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 6, Jun 81 (manuscript received 25 May 80) pp 89-92

EL'BERT, L. B., PERVIKOV, Yu. V., KRUTYANSKAYA, G. L., KRASIL'NIKOV, I. V., GRACHEV, V. P., KHANINA, M. K. and RUBIN, S. G., Institute of Poliomyelitis and Viral Encephalites, USSR Academy of Medical Sciences, Moscow

[Abstract] In connection with the insufficient potency of currently used vaccines, the effect of increasing the concentration of the inactivated virus material in tick-borne encephalitis vaccine was studied. Sof'in virus strain, grown in primary chick embryo cell culture and formalin-inactivated, was further purified and concentrated either by absorption and gel-filtration chromatography on macroporous glass or zone equilibrium centrifugation on a sucrose gradient. Results of serological tests for neutralization, hemagglutination suppression and diffusion precipitation in agar did not correlate well with cellular immunity lymphocyte blast transformation test findings. However, the protective ability of the vaccines in mice did correlate adequately with their immunogenicity in humans. The data indicate that increasing the concentration of virus particles intensifies the serological and cellular immunological response of the subject and thus is a promising approach to enhancing vaccine effectiveness. References 5: 4 Russian, 1 Western.
[310-12126]

UDC 579.852.13.083.12

ISOLATION OF RARE SAPROPHYTES, SIMILAR TO ANTHRAX PATHOGEN

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 6, Jun 81 (manuscript received 28 Jul 80) pp 106-107

PETROVA, Yu. M., LEBEDINSKAYA, I. S., KHARIKOVA, A. A. and KSENOFONTOVA, V. S., Voronezh Oblast Sanitary-Epidemiological Station

[Abstract] Of 85 samples taken from animal-product storage sites, 22 gave cultures morphologically, physiologically, biochemically and immunologically similar to anthrax, but not causing death in mice. The isolated cultures were tested at the Plague-Control, Scientific Research Institute of the Caucasus and Transcaucasus. Nineteen of the strains were found to be rare, spore-forming aerobic saprophytes, possessing capsules in vitro and various properties characteristic of the anthrax pathogen. No Bacillus anthracis was found.
[310-12126]

UDC 547.96

CHANGES IN BIOLOGICAL PROPERTIES OF TYPE A BOTULINUM NEUROTOXIN ON CHEMICAL MODIFICATION OF ITS TRYPTOPHAN AND TYROSINE RESIDUES

Moscow BIOKHIMIYA in Russian Vol 46, No 5, May 81 (manuscript received 27 May 80) pp 825-830

SHIBAYEVA, I. V., KOLESNIKOVA, V. A. and IVANOV, K. K., Institute of Epidemiology and Microbiology imeni N. F. Gamaleya, USSR Academy of Medical Sciences, Moscow

[Abstract] The action of N-bromosuccinimide and tetranitromethane, which modify tryptophan and tyrosine, respectively, was studied on a homogeneous preparation of type A botulinum neurotoxin with respect to toxicity, antigenic properties and protein conformation. Using the change in absorptivity at 280 nm as an indicator, from one to nine tryptophans were found to be oxidizable, with the first four most accessible. The modification of one tryptophan residue abolished toxicity in mice. Reaction with three residues was required to eliminate precipitation with specific rabbit antisera. Thin layer chromatography on Sephadex G-200 was used to evaluate changes in Stokes radius as a measure of conformation and indicated that this parameter was not altered by oxidation of one tryptophan but was altered by the oxidation of two. The data show that tryptophan is one of the major residues in the active site of the toxin. For the nitration of tyrosine, absorptivity at 428 nm demonstrated reaction with two to eighteen residues. The remainder of the 66 tyrosines were inaccessible. Introduction of a nitro group into the toxin was accompanied by a gradual decrease in toxicity, with twelve groups required for complete absence of animal death. All nitrated toxins formed precipitation lines with antiserum to intact toxin, but only toxins containing thirteen or less nitro groups precipitated with antiserum to toxin fragments. Modification of four to five tyrosines did not change the Stokes radius of the protein, even though 80% of its activity was lost. Further nitration altered conformation. The data indicate that tyrosine, while not as important as tryptophan, is involved in the active center of the toxin molecule. Figures 4; references 9: 2 Russian, 7 Western. [379-12126]

UDC 616-006.6-092: 576.858.6

INCLUSION OF INFLUENZA VIRUS ANTIGEN IN MEMBRANE OF AVIAN SARCOMA VIRUS

Leningrad VOPROSY ONKOLOGII in Russian Vol 27, No 10, Oct 81 (manuscript received 3 Feb 81) pp 63-67

MIGUNOVA, B. V. and KUZNETSOV, O. K., USSR Ministry of Health Leningrad Scientific Research Institute of Vaccines and Serums

[Abstract] A study was made of the possibility of phenotypic mixing in combined replication of influenza virus (A/Leningrad/0139/76(H3N2) and A/Khabarovsk/34574/77 (H1N1)) and Rous sarcoma virus (pseudotype (PAB-A)). Work was done with

chick embryos (Russkaya belaya line 9787), phenotype C/0 not containing group-specific avian leukosis or avian sarcoma antigens (GS-) or the infectious forms of lymphoid leukosis virus. Phenotypic mixing was determined by a method based on the ability of the progeny to double neutralization. Transforming activity of the progeny was completed suppressed by homologous (anti-RSV-A) immune serum and partially suppressed by heterologous (anti-influenza virus) immune serum. The content of particles whose transforming activity was suppressed by anti-influenza virus serum was about 20% of the total possessing this activity. The findings indicate that dual infection leads to phenotypic mixing, that is, the inclusion in the cell membrane of surface antigens from both of the jointly replicated viruses. It is suggested that the infectious particles with the nucleoprotein of the contaminant lymphoid leukosis virus and the membrane of the influenza virus are potentially capable of overcoming natural resistance in man to avian sarcoma virus. References 8: 4 Russian, 4 Western.
[65-9642]

UDC 576.858.095.383.052

INTERFERONS PRODUCED BY NEWBORN MICE CELLS IN PRESENCE OF NEONATAL AND ADULT SERUMS

Moscow BYULLETEN' EKSPERIMENTAL'NOY BIOLOGII I MEDITSINY in Russian Vol 92, No 10, Oct 81 (manuscript received 22 Jan 81) pp 460-462

MALINOVSKAYA, V. V., LITOVCHENKO, V. G. and BALANDIN, I. G., Institute of Epidemiology and Microbiology imeni N. F. Gamaleya, USSR Academy of Medical Sciences, Moscow

[Abstract] A comparative study was made of electrophoretic profile of antiviral activity in interferons produced by murine fibroblasts in the presence of serum from adult (variant I) and neonatal (variant II) serums. Results indicated that the interferon production in variant I was weaker than in variant II by a factor of 26. In variant I the interferon antiviral activity was concentrated in a single zone associated with a component having a molecular weight of 45 kilodaltons; in variant II it was seen in two zones, split 56.4%: 41.6%, and associated with fractions having molecular weights of 41 and 28 kilodaltons. The findings are discussed. Figures 1; references 11: 3 Russian, 8 Western.
[64-9642]

UDC (612.74+612.73):612.815

EFFECT OF ANEMONOTOXIN ON NEUROMUSCULAR TRANSMISSION IN SKELETAL AND SMOOTH MUSCLES

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 259, No 4, 1981 (manuscript received 10 Feb 81) pp 1000-1002

BAYDAN, L. V., KOZLOVSKAYA, E. P., YELYAKOV, G. B., TISHKIN, S. M. and SHUBA, M. F., Institute of Physiology imeni A. A. Bogomolets, Ukrainian Academy of Sciences, Kiev, and Pacific Ocean Institute of Bioorganic Chemistry, Far East Research Center of the USSR Academy of Sciences, Vladivostok

[Abstract] Anemonotoxin (NTC), which the authors previously isolated from the sea anemone Homostichantus duerdemi, was tested in various concentrations for its effects on excitatory myoneural transmission in N-cholinergic synapses of the Rana ridibunda frog and on inhibitory myoneural transmission in purinergic synapses of the guinea pig's intestinal smooth muscle cells. In the former case, standard microelectrode techniques were used to test curarized preparations of the sartorius muscle and noncurarized extensor longus muscle of the frog's fourth digit, NTC being used in concentrations of 10^{-6} to $5 \cdot 10^{-5}$ g/mℓ, and only the highest concentration elicited a 2.5-3-fold increase in end plante potential, without change in resting potential. In the tests with guinea pig intestinal muscle cells, the same range of concentrations led to increase in amplitude of inhibitory synaptic potentials only with application of $5 \cdot 10^{-5}$ g/mℓ NTC as well as spontaneous action potentials, with appearance of spontaneous low-amplitude inhibitory synaptic potentials. The possible causes of these findings are discussed. Figures 3; references 10: 1 Russian, 9 Western.
[41-10,657]

BIONICS

TEACHING MACHINES TO SEE

Moscow TEKHNIKA I NAUKA in Russian No 9, Sep 81 pp 10-11

[Article by E. Sorokin, special correspondent, Leningrad]

> [Text]
> Can one teach a robot not only to differentiate, let us say, between a nut and a bolt with its remote ["tele"] eye, but also to recognize the face of a person or comprehend a handwritten text, regardless of handwriting? To do this, we must, first of all, know how visual information is coded after it hits the retina of the human eye, how it is transmitted to the brain. The research of scientists at the Institute of Physiology imeni I. P. Pavlov, USSR Academy of Sciences, which our correspondent visited, will help answer these questions and develop in the future an artificial system of sight for robots, analogous to the human system.

The experimenter asks the subject: "What do you see?"

"Concentric black and white circles.... They diverge from the center of the spot at a high speed.... Now I see very distinctly that the white exit from a tunnel is drawing closer to me! Now it is going farther away from me. Farther and farther...."

Of course, there is no tunnel in the laboratory at the Institute of Physiology imeni I. P. Pavlov. The subject was seated in a chair facing a screen on which was projected a round light spot, the diameter of which the experimenter either increased or decreased. This is what creates the optical illusion in man that he is moving in a tunnel or sees diverging circles. The reason for this is that there are undulant [wave-like] processes of propagation of excitation and inhibition in neuronal structures of the EGB--external geniculate body (the main subcortical center of the visual analyzer). The optical tract from our eyes goes there; that is where visual information undergoes primary processing. This is what scientists are concerned with at this moment. How does our visual system code the diversity of the outside world, which signals travel to the higher parts of the brain? For expressly these signals deliver to us most of the information from the outside.

But before we discuss the results of the studies of Leningrad physiologists, let us recall very generally what the organ of sight is. Light, which is reflected or emitted by an object that we are looking at hits the retina of our eyes. There, photoreceptors that absorb quanta of light generate nervous signals (bioelectrical potentials), transmit them to other retinal nerve cells and then these signals travel over the optical tract to the EGB. From there, coded information is transmitted to the visual cortex and other parts of the brain, where it is decoded, processed and "interpreted."

We shall not discuss here all of the types of retinal cells and ways in which they interact. There is something else that is relevant now: neurons have been found on all levels of the retina, in different layers, which are amazing in their geometric regularity. Along with such structural orderliness, there is a strict projection conformity between different parts of the retina, EGB and regions of the visual cortex. In other words, each neuron of the visual system corresponds to a specific group of photoreceptors, linked to it by several intermediate cells. For this reason, in physiological experiments, we can always find a set of receptors (receptive field) on the retina which, by reacting to a change in energy of light in space or time, "trigger" some output neuron, causing a change in its reaction. True, it must be borne in mind that the receptive fields overlap one another, and the same neurons belong to many adjacent fields.

Thus, by recording the "behavior" of neurons, their responses to visual information delivered to the retina, experimenters can disclose the mode of coding thereof. But how are neuronal responses determined? Which parameter of neuronal impulsation reactions reflects a given property of a visual object?

"The choice of criterion of the response," explains N. Podvigin, doctor of biological sciences, who heads the laboratory, "depends on the hypothesis accepted by the researcher concerning the construction of neuronal mechanisms and principles of signal processing on the next levels of the optical system. Here, it is important to decide which parameter of a neuronal discharge is informative."

I asked Nikita Filippovich: "But the dimensions of a receptive field are strictly determined, so is it all that important to know how the neuron will react? As long as it gives us a 'yes' or 'no.'"

"That is just the thing--it is not easy to estimate the dimensions of a field and its zones. The difficulties are due primarily to the fact that the receptive fields change in both time and space. This happens because of interaction in them between excitatory and inhibitory processes."

The change in receptive fields is one of the most important mechanisms of our sight. In essence, such a field, which is circular in shape, is a tracking system that reacts to the intensity of incident light. (V. Glezer arrived at this conclusion in his studies.) As soon as the light is intensified, following excitation of a group of photoreceptors, the process of inhibition thereof begins, and the circle narrows down. Moreover, there is another important feature in the visual system demonstrated in the experiments of A. Yarbus: objects whose images are stationary for a certain time in relation to the retina are not perceived by man. This is, again, due to an inhibitory process that develops in time--so that information about the object would come in constantly, the beams reflected from it must act on photoreceptors at short intervals, or else the image must shift over the retina all of the time. For this reason, when we examine something, rapid involuntary shifting--jumps--are inherent in our eyes. Because of this, inhibition alternates with excitation, volleys of impulses--signals about the viewed object--travel over the optic nerve from the retinal neurons.

The "time section" method, i.e., determination with a computer of the number of impulses in different time intervals, was used to study the neuronal structures of the EGB of the cat's brain in order to analyze the reactions of visual system neurons to stimuli.

This is what the experiments revealed. The time and space alterations of receptive fields after each shift of the image were found to be sort of elementary "micro-acts" of visual perception. Each of them consists of three phases. During the first phase, there is accumulation of signals in the receptive field and formation of zones of excitation. The second phase consists of two stages. First the receptive fields narrow down, for which reason there is an increase in resolution of the visual system. Then the zone of excitation remains in an extremely reduced state for some time, which provides for maximum resolution--optimum visual acuity. During the third phase, the excitation zone widens, while the fields become disorganized. The "past history" of functional organization of neuronal structures is, so to speak, erased and they revert to their initial "zero" state. For expressly this reason we do not perceive images projected on the retina after each eye movement as being superimposed one over the other. Thus, the neuronal receptive fields are generated, function and disappear in these three phases.

The same electrophysiological studies revealed that propagation of excitation and inhibition in the receptive fields occurs in the form of a wave process. This interested the Leningrad scientists very much, and they began to search for an unknown psychophysiological phenomenon to confirm the findings. What if the subject would look at a light spot, the area of which will be changed at a speed that corresponds to the speed of propagation of wave processes? Would not something happen then that is similar to the resonance phenomenon? And indeed it was discovered in the experiment, with a description of which we started our story.

The discovered "accelerating wave" illusion tells us many things. For, since wave processes demonstrable from neuronal responses turned out to be "visible" in a psychophysiological experiment, it is quite probable that the frequency or number of signals in the small intervals of impulsations (responses) of neurons is expressly the code, the cipher or, as the scientists say, the "informative parameter" that is used by the system in transmitting information from the retina to the brain.

Changes in discharge frequency constitute the language used by the neurons of the visual system. This can be seen, for example, in experiments where these changes were recorded as a function of changes in intensity of light falling on the cat's retina. The experiments revealed that the changes in impulsation frequency correspond quite accurately to changes in illumination of the retina.

But, intensity of light is, I imagine, the simplest information for the visual analyzer (the visual cells of even earthworms are capable of distinguishing between light and darkness). What if the organs of sight are confronted with a more difficult task: to recognize a pattern, an object?

The mechanism of description of images on the subcortical levels of the visual system turned out to be very interesting. At the first moment after delivery of an image to the retina (or after the eye jumps), the number of excited photoreceptors in each receptive field is at a maximum. The scientists say that the diameter of the zone of summation of receptive fields is large. The system's resolution, however, is low. It can distinguish only large details of the image, i.e., it can transmit to the cortex information only about the low spatial frequencies of the image. After this, the size of the fields diminishes while the resolution increases. Now information about higher spatial frequencies is also transmitted to the cortex. Consequently, the system of such overlapping fields can be viewed as a filter of spatial frequencies that changes as a function of time.

N. Podvigin and his coworkers have expounded a hypothesis, according to which information about the spatial properties of an image are transmitted and processed in the visual system successively [one after the other]. At first, after the eye jumps and the image is fixed on the retina, there is transmission of information about the low-frequency spatial components of the image. Then, data about increasingly higher frequency components, i.e., the spatial properties of the viewed world seem to expand in the visual system in a specific order.

On the basis of these conceptions of description and processing of visual information on the first levels of the visual system, studies were pursued, whose results may be indicative of the fact that there is so-called "point-by-point" description of visual images on these levels. The visual system makes use of its inherent property of precise projection connections between retinal neurons layers of the next levels. Each place on the retina is reflected, by virtue of such construction, in a very specific place in the neuronal structure of the next level of the system. These "point by point" projection linkages are why the pattern of excited receptors which fix the object projected on them is reflected in an "analogous" pattern of excited neurons on the next level of the system. This pattern of excited neurons on one level was named the "activity contour."

The experiments also revealed that an "activity contour" corresponding in shape (with some distortions that are inherent in the visual system) to the image falling upon the retina is formed at the "output" of the receptive fields of EGB neurons. The size of the contour (frequency or number of impulses generated by neurons at each of its "points") is determined by the illumination and contrast of the image.

What conclusions can already be derived from the obtained experimental results?

"We became convinced," N. Podvigin told me, "that the number and frequency of impulses generated by neurons serve to transmit data only about the brightness and, perhaps, color of objects. Information about their shape, position in the field of vision, displacement, etc., is contained in the spatial characteristics of the activity contour that arises in the neuronal structure, as well as in the characteristics of its movement over the outputs of the receptive fields. This conception of the principle of coding and transmission of data in the visual system is very attractive: it makes use of the topography of connections inherent in the visual system, helps explain a number of psychophysiological phenomena, makes it possible to formalize and describe in model form the process of visual signal processing, as well as to answer some questions of pattern recognition. At any rate, it can be stated, even now, that without comprehensive investigation of processes of time and space alteration of neuronal structures, with consideration of eye movements, it is unlikely that we can come closer to full enough understanding of the mechanism of visual perception, which also means, the possibility of developing an artificial visual system.

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ALL-UNION CONFERENCE ON 'INSTRUMENTATION AND AUTOMATION OF SCIENTIFIC RESEARCH IN BIOLOGY,' KISHINEV, 11-13 MARCH 1981

Kiev FIZIOLOGIYA I BIOKHIMIYA KUL'TURNYKH RASTENIY in Russian Vol 13, No 5, Sep-Oct 81 (signed to press 7 Sep 81) pp 547-549

[Article by I. Sh. Kofman]

[Text] The All-Union conference on "Instrumentation and Automation of Scientific Research in Biology" convened right after the 26th CPSU Congress, which put some important tasks to biological science in order to meet man's increasing needs with respect to foodstuffs, medical care, as well as environmental protection. These tasks can be performed well only if there is excellent instrumentation, and this was mentioned in the opening remarks of A. A. Zhuchenko, president of the Moldavian Academy of Sciences. He described the main strategic directions of development of biological instrument making, the means of developing automated systems in biology, including control of the process of studying adaptive reactions of plants in the field, multichannel measurement of various physiological parameters, etc.

A wide range of issues was discussed at plenary sessions of the conference. Thus, L. P. Kayushin, chairman of the biology section of the Council for Automation of Scientific Research under the Presidium of the USSR Academy of Sciences, shed light on the current status and prospects of development of automation of biological research in the USSR. In accordance with the decree of the State Committee for Science and Technology pertaining to development of automation complexes, some unique systems were developed for demonstrating rapid free-radical reactions, analysis of microbiological objects, study of spectra of fluorescence of biological objects, etc. Under the 11th Five-Year Plan, there is a broad program of research and it is expected to develop more than 30 automated systems.

F. F. Dedus discussed automation of research at the Biology Center of the USSR Academy of Sciences (Pushchino). At the Scientific Research Center of the USSR Academy of Sciences, there has been development of problems of computer mathematics as they relate to biological research, and data processing systems have been developed. It was noted that there are more than 40 scientific laboratories at this center that use library data displays. Z. I. Zelikovskiy, director of the Center for Automation and Metrology, Moldavian Academy of Sciences, described the main directions of work to support biological research. G. Ya. Stas'yev, director of the Kishinev Branch of the Central Institute of Agrochemical Services, reported on a complex of automated systems for analysis of soil, feed and blood. A. V. Malinovskiy (Moscow) discussed development of bioengineering systems for plants.

The paper of M. B. Shtark (Novorossiysk) dealt with development of standard automation systems in biology. V. N. Verkhoturov (Moscow) shared his experience in developing information-computer complexes in a system of collective consumers in biophysical research. Use of remote airborne methods to assess and predict harvests was discussed by A. F. Chudnovskiy (Leningrad). Several papers were concerned with biomedical problems of automation.

Most of the papers were delivered at section meetings in the form of visual displays [stands]. This made it possible to submit the main data very graphically, save time and thereby intensify the work of the sections.

At a meeting of the section on "Methods and Equipment for Phytometry," there was discussion of problems of developing equipment to monitor the parameters of vital functions of plants, as well as technical aspects of artificial climate installations.

A paper delivered by a team of specialists from the Burevestnik scientific and production association dealt with construction of an automated AIK-3 measuring complex intended for investigation of processes of fluid-electrolyte metabolism in plants.

Most papers concentrated chiefly on development of equipment for complex evaluation of plant behavior under different environmental conditions. The following are intended for this purpose: photoelectric digital gauge of leaf area (I. N. Borodin, Kishinev), Biooxygraph ["biooksigraf"] instrument to record oxygen uptake (S. L. Chernikov, N. N. Shved, Leningrad), a set of automatic equipment to examine plant root systems (V. S. Semin, O. A. Il'nitskiy, Yalta), an ultrahigh-frequency moisture gauge (V. G. Reutskiy, P. A. Rodionov and others, Minsk), units for complex examination of air and gas exchange in plants (Ye. A. Kazakov, S. S. Sizov and others, Melitopol'), for determination of plant transpiration (A. S. Shcherbatyuk, Irkutsk), for automatic recording of photosynthesis, respiration and transpiration of plants (L. A. Ryazantsev, A. I. Fedchenko, Voronezh).

The papers of N. I. Turkin, V. V. Polevoy (Leningrad), A. P. Maslov, Ye. N. Popov (Moscow), L. A. Shpota (Frunze), V. P. Kovekh (Vladivostok), V. A. Novak, N. G. Ivakina (Tomsk), A. P. Vaganov, G. M. Lyaskovskiy, A. A. Romanov (Khar'kov) and others dealt with recording physiological parameters of plants.

Much interest was displayed by most of the conference participants in the work of the "Automation of Biological Research" section. Papers were submitted there from the leading centers of automation of biological research: special design offices for biological instrument making of the USSR and Azerbaijan academies of sciences, Institute of Applied Physics, Moldavian Academy of Sciences and others.

The papers of Ye. A. Serzhentu (Kishinev), V. I. Kiprin (Moscow), L. A. Abrakova, B. S. Krest'yankin et al. (Leningrad) dealt with the use of computers in biological research.

Specialists were interested in papers dealing with development and operation of automated equipment for mass scale analysis of plants by means of neutron-activation analysis (A. I. Novikov, R. A. Srapenyants, Yu. L. Kovtun et al., Moscow), spectrophotometry (V. A. Kalachev, V. N. Verkhoturov, Moscow) and other physicochemical methods (G. Ya. Stas'yev, K. V. Glinka et al., Kishinev; R. A. Srapenyants, Ye. S. Brodskiy, K. N. Klyagin, Moscow).

Several papers were concerned with engineering support of biological research (N. A. Zakharov, I. Sh. Kofman, Kiev; S. D. Kuz'menko, N. A. German, V. V. Kruchok, Kishinev; V. A. Izotov, V. P. Komarov, V. K. Kudryashov, Pushchino; O. K. Bazilenko, M. M. Kluzman, Kishinev; M. B. Shtark, Novosibirsk).

Papers were also delivered at this meeting on development of program banks to process the results of analyses, automated systems to examine the effects of various factors on biological systems and many other items.

The section of "Analytical Methods, Instruments and Systems in Biology" shed graphic light on the present and future of biological instrument making. Yu. M. Loginov, A. I. Korovin et al. (Moscow) discussed the prospects in the area of the x-ray--fluorescent method for analysis of biological systems. An analyzer for the infralow-frequency spectrum was described by V. F. Gubert, S. V. Pobozhiy et al. (Tomsk). A set of instruments used to measure radioactivity of tagged biological specimens was also described (V. N. Gross, Alma-Ata). A set of instruments for electrophoresis and electrofocusing in tubes was demonstrated (A. A. Moskalenko, Pushchino). An automated device was developed to record the membranotropic effects of chemical compounds (V. M. Yurin, A. V. Sochnev, V. A. Bobrov, Minsk).

A large group of instruments designed for disk electrophoresis and column chromatography was described in the papers of G. M. Yershov, A. V. Katin and others (Baku).

B. I. Bragin (Alma-Ata) shared his experience in using atomic-absorption spectrophotometry. The report of I. M. Belokobyl'skiy (Voroshilovgrad) dealt with reproducibility of data pertaining to nucleic acid content obtained by spectrophotometry. Use of alternating current volt-ammeters in biological research was discussed by O. S. Arutyunov et al. (Gomel').

Development and use of different methods were the topic of papers dealing with rapid preparation of protein hydrolysates for amino acid analysis (L. P. Solonenko, A. F. Sherstkin, Novosibirsk), determination of free amino acids (P. S. Fedorov, S. V. Zolotukhin, Frunze), modification of the Kjeldahl method (I. M. Bazavluk, Novosibirsk) and analysis of vegetable oils (I. D. Komissarov, L. F. Loginov, Tyumen').

During the period of the conference, there was an exhibit of new instruments and equipment--"Bioinstrument-81" ["Biopribor-81"]. The exhibits demonstrated the growing trend toward developing totally automated systems linked with computers, which permit monitoring and controlling multifactor processes. In this regard, we should like to mention instruments designed in the special technological design office of the Institute of Applied Physics, Moldavian Academy of Sciences: moisture gauge for plant leaves, portable, wireless temperature gauge, recorder of discharge fluorescence for high-speed determination of the physiological state of plants, device for automatic measurement of plant parameters in an artificial climate, and others.

On the whole, it was noted that development of biological instrument making is governed by the main requirements of modern science; however, it is not rapid enough. The conference participants expressed their confidence that its occurrence at this time will aid in solving pressing problems of modern agricultural production, biomedical problems and in increasing the effectiveness of biological research.

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10,657
CSO: 1840/22

UDC 579.842.11:579.222:577.152.277

PURIFICATION AND IDENTIFICATION OF ECO CK RESTRICTIVE ENDONUCLEASE

Moscow VESTNIK AKADEMII MEDITSINSKIKH NAUK SSSR in Russian No 2, Feb 81
(manuscript received 12 Jun 80) pp 21-26

UPOROVA, T. M., NIKOL'SKAYA, I. I., RUBTSOVA, Ye. N. and DEBOV, S. S., Laboratory of Enzymology, USSR Academy of Medical Sciences, Moscow

[Abstract] The purpose of this study was to develop a system of purification of restrictive endonuclease--REco CK--isolated from a previously discovered new system of host specificity of DNA in E. coli CK cells, to remove contamination by nonspecific endonucleases and exonucleases, so that it could be used in gene engineering. Purification consisted of several stages, with cells from the E. coli CK bacterial strain in the collection of the Enzymology Laboratory, USSR Academy of Medical Sciences, used as the source of the above enzyme: gel filtration on biogel A-0.5 m, separation using heparin-sepharose and chromatography on single-stranded and double-stranded DNA-cellulose. Restrictive activity was measured by the method of S. S. Aleksandrov, and products of hydrolysis of DNA λ of REco RI were used as markers to estimate molecular masses of 3 fragments, A, B, C, formed upon hydrolysis of DNA of lambda phage by the pEco CK enzyme. Such treatment yields a pure enzyme that is suitable for the above purpose and identification of lambda phage DNA fragments whose sizes are listed, and it is indicated that such fractions had not been described in enzymes other than REco CK. Figures 4; references 6: 2 Russian, 4 Western.
[12-10.657]

UDC 578.826:578.222

CLONING OF INTERNAL FRAGMENTS OF ADENOVIRAL DNA

Moscow VESTNIK AKADEMII MEDITSINKIKH NAUK SSSR in Russian No 2, Feb 81
(manuscript received 12 Jun 80) pp 32-35

BOBKOV, A. F., RASSULIN, Yu. Yu., KALININA, T. I., FAYZULLIN, L. Z. and DREYZIN, R. S., Institute of Virology imeni D. I. Ivanovskiy, USSR Academy of Medical Sciences, Moscow

[Abstract] To simplify the study of adenoviral molecular biology, different fragments of human adenovirus type 6 (AD-6) and simian adenovirus 7 (SA7) were cloned in E. coli cells to test expression of virus-specific sequences in these cells. Plasmic pBR 322 was used as the vector, which imparts ampicillin and tetracycline resistance to carrier bacteria, and clones with hybrid plasmids were sought in the tetracycline-resistant gene sites for specific endonucleases Hind III and BamHI, use being also made of phage T4 polynucleotide ligase. Inserted AD-6 and SA7 DNA fragments were identified by means of Hind III. Hybrid plasmids obtained with fragments of AD-6 and SA7 DNA were hybridized and submitted to restriction analysis, showing 10 fragments of AD-6 DNA (C_2 being missing) and all inner fragments in SA7

DNA. It was also demonstrated that it is possible for expression of adenoviral sequences in E. coli bacteria, on the basis of hybridization of ^{3}H-labeled RNA from E. coli C600 containing pBR 322 and pBG 512 plasmids with DNA from SA7, pBG 512, pBR 322 and lambda phage. Figures 1; references 10: 2 Russian, 8 Western.
[12-10,657]

UDC 577.212.3

ECOR1 RESTRICTION IN VIVO: POSSIBLE USE IN GENETIC ENGINEERING

Moscow VESTNIK AKADEMII MEDITSINKIKH NAUK SSSR in Russian No 2, Feb 81
(manuscript received 2 Jul 80) pp 40-46

SKAVRONSKAYA, A. G., ALESHKIN, G. I., DEMKIN, V. V., STRIKHANOV, S. N. and YEVDOKIMOVA, N. M., Institute of Epidemiology and Microbiology imeni N. F. Gamaleya, USSR Academy of Medical Sciences, Moscow

[Abstract] A survey is first offered on the strides made in gene engineering: identification of the mechanism of restrictase effects on DNA, use thereof to clone DNA of diverse origin using vector plasmid and bacteriophage molecules, use of recombinant DNA molecules for identification of structure and function of clone fragments, demonstration of recombination of plasmids by restricase EcoR1 in vivo, suggesting that restrictases are involved in forming recombinant DNA in prokaryotes. A study was made of the structure of plasmids coding EcoRI and specificity of restrictases coded by plasmids of strain NM182 which produces EcoR1. There was stimulation by EcoR1 of recombination of plasmids in E. coli recA$^+$ and recA cells. Structural analysis revealed that plasmids coding EcoR1 restrictase can be used as a vector for in vivo DNA cloning, since they show ColE1 type replication, yield transmissive and nontransmissive elements, and most of the derivatives retain the genes of EcoR1 restriction and modification. Sedimentation profiles of the NM182 plasmid and its derivatives are illustrated; results of culturing bacteriophage lambda on E. coli K-12 with plasmids coding EcoR1 are tabulated. It is concluded that in vivo restriction of EcoR1 can be used in genetic engineering. Figures 1; references 16: 6 Russian, 10 Western.
[12-10,657]

UDC 578.826.2:578.52

VIRAL SEQUENCES IN DNA OF RAT CELLS TRANSFORMED BY DNA OF SIMIAN ADENOVIRUS SA7 AND DNA OF HUMAN ADENOVIRUS TYPE 6

Moscow VESTNIK AKADEMII MEDITSINKIKH NAUK SSSR in Russian No 2, Feb 81
(manuscript received 12 Jun 80) pp 64-70

CHAPLYGINA, N. M., KALININA, T. I., GARTEL', A. L., PONOMAREVA, T. I., TYUNNIKOV, G. I., NARODITSKIY, B. S., DREYZIN, R. S. and TIKHONENKO, T. I., Institute of Virology imeni D. I. Ivanovskiy, USSR Academy of Medical Sciences, Moscow

[Abstract] This is a continuation of studies showing that whole DNA of SA7 and AD-6 [human] adenoviruses, mixtures of fragments of DNA hydrolysis of some specific endonucleases, as well as other fragments have neoplastic activity. Here, the viral sequences were analyzed in rat DNA treated with SA7 and AD-6 DNA. Renal cell cultures obtained from 5-7-day WAG rats served as material, submitted to transformation by SA7 and AD-6 cultured in green marmoset kidneys. "Spot" hybridization on nitrocellulose filters was used to analyze viral sequences in transformed DNA. Kinetics of reassociation of SA7 DNA in the presence of DNA of transformed cells were also examined, and copies of viral DNA fragments in the cell genome counted using the formula of P. A. Sharp et al. DNA fragments were separated by electrophoresis after treatment with specific endonucleases. Sequences homologous to all fragments of hydrolysis were demonstrated in DNA of rat cells transformed by DNA of above adenoviruses, as opposed to loss of most of the viral genome in the case of recombination with whole adenoviral DNA. Further studies are needed to determine where prefragmentation of viral DNA affects its recombination with cellular DNA, since it has been suggested that this could enhance integration of the "oncogenic" [in the case of simian adenovirus] locus, as well as the entire set of fragments. Figures 6; references 30: 7 Russian, 23 Western.
[12-10,657]

MEDICAL DEMOGRAPHY

UDC 614.7 + 613.1]: 312.6

DETERMINATION OF ROLE OF ISOLATED FACTORS IN TOTAL ENVIRONMENTAL EFFECT ON PUBLIC HEALTH

Moscow GIGIYENA I SANITARIYA in Russian No 9, Sep 81 (manuscript received 15 Dec 80) pp 4-6

SHANDALA, M. G. and ZVINYATSKOVSKIY, Ya. I., Kiev Scientific Research Institute of General and Communal Hygiene imeni A. N. Marzeyev

[Abstract] Studies on environmental pollution in the Ukraine and its effect on public health have been conducted at the Kiev Scientific Research Institute of General and Communal Hygiene since the fifties. As a follow-up to quantitative evaluations of health as a function of pollution factors taken together and in isolation, a two-stage study was done to collect more data on this hygiene problem. In the first stage generalized data were obtained, from 19 cities typifying economic and geographic conditions in the Ukraine, on the effect of environmental factors on health, wherein general trends could be discerned. The second stage of the study was a detailed examination of 32 indices for environmental factors in a single city and their isolated effect on various disease categories in children and infants. Models describing the effect of the environmental factors on health in adults and children were constructed from the findings in the first stage of the study and used in the second stage to determine maximum permissible levels for individual environmental factors above which the incidence of disease starts to rise. The models were also used to predict possible future changes in the general health of the population as a function of changes in isolated and combined environmental factors. References 12 (Russian).
[26-9642]

UDC 616-082: 313.13

EXPERIENCE IN STUDYING PUBLIC OPINION ON QUALITY OF HEALTH-CARE SERVICES

Moscow SOVETSKAYA MEDITSINA in Russian No 9, Sep 81 (manuscript received 27 Feb 81) pp 118-120

GORDON, Yu. N., GOL'TSEV, G. V. and DOLINSKAYA, T. G., No 4 City Hospital, Odessa

[Abstract] The public's attitude toward health-care provision is determined by the creation of trust between physician and patient and early consultation for

medical assistance and is a social problem. Earlier attempts to assess public attitudes toward health care facilities have not always taken into account the social features of people polled, and good representative sampling has been deficient. In the present study the questionnaire method was used in an attempt to clarify the layman's attitude toward aspects of health care which he is most competent to judge, namely the availability and timeliness of medical care and the behavior of medical personnel. The questionnaires consisted of 15 questions concerning the opinion of hospitalized patients on the attending physician and satisfaction with the work of nursing staff and the staff of other medical services; the social background of persons filling out the questionnaires was also covered. Questionnaires were sent to 5,000 patients, or 11 percent of the total number of patients, and 770 replies (15.4%) were received. Similar questionnaires were given to patients attending the outpatient department; replies were received from 42.6% of the 2,010 questionnaires distributed. Some 78.1% expressed general satisfaction with the health-care services rendered; 5.7% were dissatisfied and 16.2% were undecided. The greatest causes of dissatisfaction were found in reception (21%) and in failures to attend to patients waiting in line in the correct sequence (38%); also, one in ten patients expressed dissatisfaction with the quality of the health care provided. The findings can serve as the basis for improving health-care services and enhancing responsibility and discipline among medical staffs. It is imperative to consider sociodemographic factors when conducting similar polls. Standardization of a polling system would be useful for comparative analysis of health-care provision by different facilities. References 8 (Russian).
[23-9642]

UDC 616.12-008.331.1(47+57)

ARTERIAL HYPERTENSION IN EASTERN REGIONS OF USSR OF NEW ECONOMIC DEVELOPMENT

Moscow VESTNIK AKADEMII MEDITSINSKIKH NAUK SSSR in Russian No 9, Sep 81
(manuscript received 6 Apr 81) pp 18-21

SEDOV, K. R., Siberian Department of the USSR Academy of Medical Sciences,
Novosibirsk

[Abstract] This study was prompted by the high incidence of diseases associated with arterial hypertension--essential hypertension, some forms of symptomatic hypertension--among the public, including people in Siberia and the Far East, where regions undergoing economic development involve difficult conditions referable to landforms, topography and continental climate with considerable fluctuations of ambient temperature. Statistics on this condition are given for construction workers in the western segment of BAM [Baykal-Amur Mainline Railroad] (villages of Kunerma, Ul'kan and Zvezdnyy) and residents of Irkutsk. Early forms of essential hypertension were found more often among BAM workers than Irkutsk residents, while the latter suffered more often from essential hypertension grades IIA and IIB, and renal hypertension. The incidence of hypertension is compared to the patients' classification as to hemodynamic type of circulation (hyperkinetic,

normokinetic, hypokinetic and mixed). Hypertensive individuals presented higher blood sugar level, as well as higher epinephrine and norepinephrine levels in urine. Blood pressure dropped among BAM workers after adaptation to new living conditions in 43.6% of the cases. Cholesterol and triglyceride levels were higher in new arrivals than in the indigenous population. The findings indicate that there is an urgent need to continue work on the problem of arterial hypertension in areas undergoing development in the direction of studying the effects of environmental factors, definition of clinical variants of hypertension, study of pathogenetic mechanisms, elaboration of diagnostic criteria of symptomatic hypertension, as well as effective methods of treating the "hypertensive adaptation stress syndrome," prevention and treatment of diseases associated with hypertension. References 18: 16 Russian, 2 Western.
[19-10,657]

UDC 616.348-006.6

DIAGNOSIS AND THERAPY OF COLON CANCER (ACCORDING TO DATA REFERABLE TO MOSCOW MUNICIPAL ONCOLOGICAL DISPENSARY)

Moscow VESTNIK AKADEMII MEDITSINSKIKH NAUK SSSR in Russian No 9, Sep 81 (manuscript received 20 Nov 80) pp 84-88

KNYSH, V. I., PROROKOV, V. V., OZHIGANOV, Ye. L., BARSUKOV, Yu. A. and ZASEYEV, V. K., All-Union Oncological Research Center, USSR Academy of Medical Sciences, Moscow, and Moscow Municipal Oncological Dispensary

[Abstract] This study was undertaken because statistics on incidence of carcinoma of the gastrointestinal tract (which cover various forms thereof) have not yet been published with respect to incidence of carcinoma of the colon in particular, whereas analysis of morbidity, diagnosis and therapeutic care in various specific regions would help upgrade oncological care of these cases. The processed data consisted of primary records of all cases of cancer of the colon in Moscow over a 7-year period--1972-1978, which revealed that the incidence thereof has been increasing annually on the whole, but has been relatively stable in all age groups under 60 years. Incidence of carcinoma in different segments of the colon, distribution of patients according to stage of neoplastic process, distribution of cases according to year and age group, forms of therapy and reasons for not instituting radical therapy are tabulated. Chemotherapy with 5-fluorouracil and the Soviet product, fluorafur [N'-(2-furanidyl)-5-fluorouracil] has become popular in recent times, although it is still used in only 1% of the cases. Detection of this pathology is made at late stages of the disease. Progress must be made in early diagnosis of this pathology, treatment in specialized institutions and wider use of drug and radiation therapy. Figures 3; references 14 (Russian).
[19-10,657]

UDC 616.127-005.8-036.2(571.14)-25

RESULTS FROM 2-YEAR EPIDEMIOLOGICAL STUDY OF ACUTE MYOCARDIAL INFARCTION IN NOVOSIBIRSK

Moscow TERAPEVTICHESKIY ARKHIV in Russian Vol 53, No 8, Aug 81
(manuscript received 21 May 80) pp 10-13

MAZUR, N. A., NIKITIN, Yu. P. and GAFAROV, V. V., All-Union Cardiological Center, USSR Academy of Medical Sciences, Moscow, Department of Therapy and Cardiology, Novosibirsk Medical Institute

[Abstract] Using WHO-recommended criteria, a 2-year study on the incidence of acute myocardial infarction was conducted in the Novosibirsk area during the period 1977-1978 in persons aged up to 65. Incidence per 1,000 was 3.67 for men and 1.72 for women in 1977 and 3.86 for men and 1.72 for women in 1978. Highest incidence in men occurred within the 40-49 age group; in women in the 50-59 age group. The age-sex breakdown of incidence and analysis of complications occurring within 28 days of infarction are shown in a table. In most cases the pain symptoms and EKG changes were typical. Sudden death occurred most frequently with acute coronary insufficiency and myocardial infarction before patients could be hospitalized. It is concluded that measures to hospitalize patients more quickly and initiate intensive care must be implemented so that incidence of death before arrival at the hospital can be reduced. References 9 (Russian).
[63-9642]

UDC 616.24-002-053.31-02: 618.2-06 + 618.3]-036.88

ANTENATAL RISK FACTORS AND INFANT MORTALITY FROM PNEUMONIA IN EARLY NEONATAL PERIOD

Minsk ZDRAVOOKHRANENIYE BELORUSSII in Russian No 10, Oct 81 (manuscript received 29 Aug 80) pp 42-43

DENISEVICH, S. I., Belorussian Scientific Research Institute of Maternity and Infant Protection

[Abstract] Neonatal deaths resulting from pneumonia in maternity departments were analyzed and medical and biological risk factors, whose consideration can assist in correct diagnosis of pneumonia in the early neonatal period, were determined and evaluated. The study was conducted by analyzing the case records of each infant death. The analysis was done for 209 neonates, 55 of whom died during the first 7 days of life in maternity rooms of hospitals in Minsk during 1979 with a diagnosis of pneumonia. In 27 infants (29.1%) pneumonia was the main disease and cause of death; in the other infants the pneumonia developed against a background of severe disease and was the concomitant or complicating cause of death. Some 70.9% of the infants dying from pneumonia were males. Most infants (74.5%) were

born in a very serious condition: one in five of the infants had suffered from intrauterine hypoxia, and 12 were born in a state of asphyxia. The analysis indicated the importance of carefully considering the anamnesis of the mother to determine the threat of infection in the child: 61.8% of the mothers had suffered from pyelonephritis, chronic bronchitis, pneumonia, diabetes mellitus or tonsillitis during pregnancy, and some had genital pathologies. About 50% of the mothers were primigravida. Previous pregnancies had terminated pathologically in 22 out of 27 mothers. In 67% of mothers, complications were seen in early amniorrhexis, weakness in labor, placental detachment and endometritis. It is concluded that a prolonged period following discharge of the amniotic fluid and endometritis during labor must be considered the main risk factor for the infant. References 3 (Russian).
[61-9642]

UDC 616.053.66(476.7)

INCIDENCE OF DISEASE AMONG ADOLESCENTS IN A RURAL REGION OF BELORUSSIA

Minsk ZDRAVOOKHRANENIYE BELORUSSII in Russian No 10, Oct 81 (manuscript received 12 May 81) pp 53-55

SOLONENKO, Yu. T., Lyakhovich Central Rayon Hospital

[Abstract] Examinations were made of 2,938 adolescents aged 15 to 18 in the Lyakhovich Rayon of Brest Oblast during the period 1975-1977 to determine the incidence of disease among them. Most subjects were students at general education schools (69.9%); 24% were studying at sovkhoz technical colleges and 6.1% were working. The medical examination board was made up of a surgeon, neuropathologist, psychoneurologist, otorhinolaryngologist, oculist and dentist. The most frequently encountered chronic diseases included those of the skeletal and muscular systems and the respiratory organs, and also, impaired vision and dental caries. Endocrine and metabolic disorders, blood diseases and circulatory disorders and diseases of the urogenital system were more frequent in females. The incidence of chronic diseases in the period studied was less than in earlier years and diseases were generally less severe. The main cause of loss of work capacity was acute respiratory disease. Cases of suppurative otitis and chronic pneumonia were not found; cases of tuberculosis were isolated. The more favorable situation is attributed to improvements in medical care, together with better diet and mass physical culture work. Dental caries and residual signs of rickets remain at a high level. Some correlation was found between the incidence of disease in adolescents and various adverse factors (family situations, lack of sleep, alcoholism in parents, heavy study, etc). References 6 (Russian).
[61-9642]

UDC 331.225: 614.23: 34

INCREASES IN PROFESSIONAL SALARIES FOR PHYSICIANS IN HEALTH CARE ESTABLISHMENTS

Minsk ZDRAVOOKHRANENIYE BELORUSSII in Russian No 10, Oct 81 pp 75-76

SIKORSKIY, V. M., legal adviser, Belorussian SSR Ministry of Health

[Abstract] In accordance with CPSU Central Committee and USSR Council of Ministers decree No 870 of 22 September 1977 "On Measures To Further Improve Public Health," with effect from 1 January 1981 physicians working in uchastok hospitals and outpatient departments in rural locations, uchastok therapists and pediatricians, physicians in city and rayon polyclinics, physicians attached to the emergency medical services, and in aviation medicine stations and emergency departments in any of the above-mentioned facilities will receive a monthly salary increase of 10%; this raise applies to physicians during the first 3 years of their work in these facilities; for each subsequent 2 years of continuous service a further 10-percent raise is given. Maximum raises cannot exceed 40% for physicians in hospital outpatient departments and uchastok hospitals or 30% for physicians having a right to the increase. Examples are used to clarify the details of salary increases as applied to various categories of physicians. No references.
[61-9642]

UDC 617.7-084.3[(47 + 57)]-22: 614.885-057

EXPERIENCE IN RECRUITING STUDENTS FOR MASS SCREENING OF THE EYES AMONG RURAL POPULATION

Moscow VESTNIK OFTAL'MOLOGII in Russian No 4, Jul-Aug 81 pp 67-68

DZHALIASHVILI, O. A., professor, BORTSOV, V. N., ASTAKHOV, Yu. S. and SLOYEVA, Ye. P., Department of Ophthalmology, First Leningrad Medical Institute imeni I. P. Pavlov

[Abstract] During the past 6 years, mass screening of the eyes among rural populations in Leningrad Oblast to detect diseases and determine clinical refraction for selection of correcting glasses has been done with the assistance of brigades of first-year students from the Department of Diseases of the Eye. A brigade consisted of an "assistant" and 4 to 7 students. During this period 7,000 individuals were screened, including 5,000 living in rural localities; and more than 40 talks were given on eye hygiene, prevention of eye injuries and the initial signs of glaucoma. After being given specific instructions, the students with all necessary equipment spent periods of 6 to 8 days in rural localities conducting the mass screening. The results indicated that a team of four students can handle 10 to 12 workers or 20 schoolchildren per hour. When necessary, one pair of students from a team travelled into more remote areas to make the examinations. All work was done under the direct supervision of the assistant. After the

students returned to Leningrad from field trips, the results were analyzed and lists made of individuals requiring further ophthalmological care. During the review period, correcting eye glasses were prescribed for 2,500 individuals, almost 300 cases of glaucoma were detected, and other suspected diseases were further investigated. In addition to improving public health care services, this work accustoms students to practical work in their discipline and familiarizes them with sanitation-educational work. No references.
[60-9642]

UDC 616-006.04(47 + 57) "1978"

MALIGNANT NEOPLASMS IN THE USSR IN 1978

Leningrad VOPROSY ONKOLOGII in Russian Vol 27, No 9, Sep 81 pp 3-23

NAPALKOV, N. P., MERABISHVILI, V. M., TSERKOVNYY, G. F. and PREOBRAZHENSKAYA, M. N.

[Abstract] A comprehensive statistical survey is made of the problem of malignant neoplasms in the USSR based on the 1978 figures. Although total monetary resources spent on the care of cancer patients in the USSR increased during the 10th Five-Year Plan, in 1978 the number of beds available for such patients had decreased slightly. Most of the increased incidence of malignant neoplasms is taking place in the RSFSR, the Ukrainian SSR and the Moldavian SSR; incidence fell in seven of the union republics. The absolute increase of cases recorded for the first time in 1978, compared with 1977, was 2.2%; the absolute increase in all cases was 1.2% (199 per 100,000). The incidence of malignant neoplasms of the mouth and throat, rectum, larynx, trachea, bronchi, lungs and breast increased. Many forms of cancer are increasing among the urban populations, while in rural populations they have been halted or are decreasing. Incidence in men exceeded 200.0 cases per 100,000 in women, 200.8 per 100,000. In men the incidence decreased in the age groups from 30 to 59, and in women from 0 to 60. Details are given of trends in all categories of malignant neoplasms, and comprehensive statistics are provided in tables showing the age-sex and site of cancers in patients being treated in all the union republics. Changes in the approach to the treatment of these diseases are described; surgical management has increased, although chemotherapy is still used extensively; details are provided in tables. Mortalities from malignant neoplasms are increasing (14.1 percent of all deaths). Tumors of the digestive and respiratory organs accounted for 66.2 percent of deaths from cancer. Deaths resulting from neoplasms of the GI tract, larynx, lungs, skin, breast and lymph and hematopoietic tissues are increasing; deaths resulting from neoplasms of the mouth and throat, esophagus, stomach, bones, connective tissue and the uterine cervix are decreasing. Figures 2; references 9 (Russian).
[59-9642]

UDC 616.155.194.125-036.1-053.2(479.24)

DIFFERENT FORMS OF BETA-THALASSEMIA IN CHILDREN IN AZERBAIJAN

Moscow PROBLEMY GEMATOLOGII I PERELIVANIYA KROVI in Russian No 9, Sep 81
(manuscript received 29 Oct 80) pp 3-7

RUSTAMOV, R. Sh., DADASHEVA, T. S., doctor of medical sciences, and LIMBORSKAYA, S. A., Institute of Medical Parasitology and Tropical Medicine imeni S. M. Kirov, Baku, Institute of Maternal and Child Protection, Baku, Institute of Medical Genetics, USSR Academy of Medical Sciences, Moscow

[Abstract] An attempt was made to distinguish the different forms of thalassemia occurring in children in Azerbaijan on the basis of analysis of clinical material covering the period 1977-1980. Studies were done on 166 subjects, including 57 homozygotes for beta-thalassemia and 109 parents of patients who were heterozygotes for various thalassemic genes; four groups of thalassemia were distinguished. Heterozygotes included 37 children aged 1 to 14 years (group 1) in whose parents an elevated level of HbA2 was found; group 2 containing five children aged 2 to 13 years with typical clinical and hematologic signs of thalassemia major; six children aged 1.2 to 5 years with virtually the same signs as in severe classical beta-thalassemia (group 3); and group 4, containing eight patients aged 1 to 15 years and one aged 22 with the same but less marked symptoms as in group 3 subjects. Details of clinical and hematologic signs are given for homozygotic patients and their patients in these four groups. The findings indicate a high incidence of the "silent" beta-thalassemia gene among the population of Azerbaijan and it is concluded that the beta-thalassemia occurring there is notable for its great heterogeneity. Figures 2; references 10: 5 Russian, 5 Western.
[45-9642]

PROFESSOR ADVISES AGAINST ABORTION, RECOMMENDS CONTRACEPTIVE METHODS

Moscow ZDOROV'YE in Russian No 8, Aug 81 pp 26-27

KIRYUSHCHENKOV, A. P., professor

[Abstract] The advantages and disadvantages of various contraceptive methods are discussed--IUD [intrauterine devices], diaphragm, diaphragm combined with contraceptive cream, contraceptive pills and the physiological (rhythm) method. While there are contraindications for mechanical contraceptives (presence of inflammatory diseases of internal reproductive organs, individual structural features of reproductive organs) and all must be used under the supervision of a physician, who must instruct women on proper use of diaphragm or intake of pills, they are rather reliable when properly used, but are recommended only for the monthly "danger" periods (8th to 18th day of menstrual cycle in the case of a 28-day cycle, 12th to 19th for a 30-day cycle, 5th to 15th for a 26-day cycle), and use of rhythm method is advocated for the rest of the time.
[35-10,657]

MEDICINE

UDC 617-001.17-089:616.5:636.4]-089

PIGSKIN XENOGRAFTS IN TREATMENT OF PATIENTS WITH EXTENSIVE BURNS

Moscow KHIRURGIYA in Russian No 5, May 80 (manuscript received 5 Jun 79) pp 14-16

[Article by Prof. V.K. Sologub, Dr of Medical Sciences M.I. Dolgina, D.A. Donetskiv and S.S. Morozov, V.G. Borisov, Z.G. Goncharova and G. G. Serov, candidates of medical sciences, All-Union Burn Center, Institute of Surgery imeni A.V. Vishnevskiy, Moscow]

[Text] One important condition for successful treatment of patients with extensive deep burns is the earliest possible coverage of the wounds with skin autotransplants. However, complete early coverage with autografts is generally impossible for extensive severe burns, as in the case of massive injuries. In order that the patient's already grave condition not be exacerbated by the additional trauma involved in removal of autografts and that no risk of rejection of skin autotransplants be created in cases where another set of grafts cannot be taken from the patient, one must therefore resort to coverage of the wounds with skin of allo(homo)genic, xeno(hetero)-genic, or zoogenic origin or with an artificial film.

Foreign surgeons have been making increasing use of preserved pigskin (O'Neill; Zilly; MacMillan; Kine et al.; Silverstein).

In 1974, the Tissue Preservation Laboratory of the All-Union Burn Center worked out the details of a method for preparation and preservation of pigskin xenografts. After testing on laboratory animals, the new covering material thus obtained was submitted for clinical trials in the burn-therapy department.

Clinical observations were made on 60 patients ranging in age from 18 to 70 years (an average of 42 years) who had deep burns over from 10 to 70% of their body surface (averaging 25%). Indications for use of the xenoplastic covering material were a need to delay autodermatoplasty because the wound matrix was not ready for coverage with autografts, impossibility of simultaneous removal of a large number of grafts, seriousness of the patient's general condition to a degree precluding the additional trauma associated with removal of autografts and increasing the risk of graft rejection, and the need to protect the transplanted skin autografts against drying out when treatment was by the exposed method.

Twenty patients were treated by the exposed method. They were kept in rooms with a laminar flow of air that was warmed to 32-34°C and sterilized by microfiltration. Each day, following a warm bath with a detergent or other antiseptic, the xenografts previously applied to the burns were removed, necrectomy was carried out when necessary, and the wound surface was then covered with new xenotransplants. The wounds became covered with granulations after 2 or 3 days. This served as a signal for autodermatoplastic coverage of the burns. The autografts (0.2-0.3 mm thick) were perforated with a special instrument (M.I. Kuzin and D.A. Donetskiy), stretched (1:3), and protected against drying out by application of an external layer of xenotransplants. The xenotransplants were replaced with new ones after 4-5 days.

Forty patients were treated by the protected method, in which a gauze dressing was applied over the xenotransplants. As a control, comparable areas on the bodies of 37 of these patients were covered with allogenic skin grafts, using skin taken from cadavers and subjected to the same processing as the pigskin transplants. The patients had their dressings changed and the transplants renewed after 2-5 days (an average of 3 days), depending on the course of the healing process.

The criteria used in evaluating the results were the general clinical indices of the course of the burn syndrome and various clinical and laboratory data (blood morphological composition, serum protein content, and electrophoretic indices of serum protein fractions), as well as indicators of the course of the local healing process (status of granulation, epithelial regenration, and cytological pattern of wound prints).

In all 60 patients, coverage of the burns with preserved skin grafts of both allogenic and xenogenic origin was accompanied by a reduction in or elimination of pain, which enabled them to change position in bed more actively, move with greater freedom, undergo a considerable improvement of attitude, and begin to anticipate recovery. These positive changes were also furthered by the reduction in fluid and heat losses after coverage of the wounds with xenografts and allotransplants, the decrease in the degree of hypoproteinemia, the tendency toward normalization of the electrolyte and energy balances, and the reduction in the danger of superinfection. In patients with bleeding granulations, the bleeding stopped after the burns were covered with xenogenic transplants. In the case of burns of degree IIIa, reepithelization generally began on the 12th-15th day for protected wounds. When the burns were deeper, reticular skin grafts took well when covered with xenotransplants; the spaces became filled with epithelial outgrowths by the 10th day.

In 8 of the 60 patients, use of xenotransplants for superficial burns of degree IIIa promoted healing without formation of extensive scars. Xenoplasty permitted successful cutaneous autoplasty in 45 patients, both after local necrectomy and after spontaneous sloughing of the crust. The change in the appearance of the wounds was paralleled by normalization of the morphological indices of the peripheral blood, the serum protein content and protein-fraction composition, and the cytological pattern of wound prints.

Together with a characteristic appearance (a fine-grained bright-red surface), one reliable sign that the wound granulation tissue was ready for autodermatoplasty was the presence in the wound prints of a significant number of mature connective-tissue cells; another sign was the characteristic "acceptance" of allogenic and xenogenic skin grafts. Autodermatoplasty carried out after these symptoms developed was always accompanied by 100% graft survival.

We observed "acceptance" of both xenografts and allografts; however, while the xenotransplants that took were usually easy to remove from the wound, "initially accepted" allotransplants were difficult to remove and their removal was accompanied by bleeding resulting from damage to the blood vessels that had grown into the graft, a phenomenon that often prevented autodermatoplasty. Complete autoplastic coverage was carried out in stages, as the granulation tissue matured and the donor areas recovered.

Patient A., 19 years of age, was burned by flames. On admission, 40% of his body surface was covered with burns of degree IIIb. He was suffering from bilateral pneumonia and debility. As a result of the patient's grave general condition, the wounds on the face were covered with autografts and those on other areas of the body with xenografts and allografts. His general condition improved. The partial acceptance of the autotransplants on the face confirmed the validity of delaying more traumatic removal of extensive skin grafts for coverage of the burns on other parts of the body. Later, when the donor areas healed and the temporary covering (xenografts and allografts) was removed from the wounds, all the burns were covered with final reticular autografts in a stepwise procedure. The patient recovered with a minimum of deforming scars and good function for the upper shoulder girdle.

In 53 of the 60 patients, use of preserved-pigskin xenografts made it possible to obtain complete healing. None of the patients exhibited detrimental sequelae from the use of preserved xenotransplants, e.g., deterioration of their general condition, symptoms of sensitization, and rejection reactions. Even those patients with particularly severe injuries (incompatible with survival) responded to coverage of their burns with preserved-pigskin grafts with alleviation of the pain syndrome, cessation of blood and lymph losses, a reduction in the amount of pussy exudate from the wounds, and a slowing down of their progressive debilitation.

Use of xenotransplants permits intensification of the treatment of burn patients by means of extensive early necrectomy, simultaneous partial (and possibly more complete) autodermatoplasty, temporary coverage of the remaining areas with xenotransplants, and earlier initiation of physical therapy and other measures intended to further recuperation.

Pigskin xenotransplants, like allotransplants, not only facilitate formation of regenerating epithelium and granulation tissue suitable for acceptance of skin autotransplants beneath the protective overgrowth they produce but also prevent development of hypertrophic granulations, which lead to extensive deforming scars.

Among the important positive features of pigskin xenotransplants are their porous structure and biological inertness; these ensure good drainage of the wounds they cover, eliminate any tendency toward "primary acceptance," and enable them to be easily removed at any desired time so that final autodermatoplasty can be carried out.

CONCLUSIONS

1. In comparison with cadaver allotransplants, pigskin xenotransplants are easier to prepare in terms of procedural organization and technology; they can be produced on a serial basis and are epidemiologically safe, since the donor animals do not carry any diseases of the sort that can be transmitted by allogenic grafts (tuberculosis, infectious hepatitis, etc.).

2. Use of cutaneous xenotransplants as a biological dressing for patients with severe burns, like use of allotransplants, permits a considerable improvement in neurological and psychological status, reduces heat, water, protein, and electrolyte losses, prevents microfloral invasion of the wound, and keeps the patient from becoming anemic.

BIBLIOGRAPHY

1. Kine, S., Schill, H., Roewer, J., et al., ZBL. CHIR., Vol 101, pp 1481-1494, 1976.

2. MacMillan, B.G., BURNS, Vol 2, pp 1-13, 1975.

3. O'Neill, J.A., J. PEDIAT. SURG., Vol 8, pp 705-709, 1973.

4. Silverstein, P., in collection: "International Congress of Burn Injuries, 5th Abstract Book", Stockholm, 1978, p 110.

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CSO: 8144/007

SUPPORT ROLE OF AVIATION PHYSICIANS

Moscow GRAZHDANSKAYA AVIATSIYA in Russian No 6, Jun 81 p 24

[Article by I. Alpatov, candidate of medical sciences]

[Text] Health and physical conditioning of flight personnel play a rather important part among the requirements that determine the reliability of an aircraft. A system of medical support of flights and monitoring of pilots' health status has been formed in Aeroflot. Many of its elements, including regular preflight examination of crews, a wide network of flight prophylactoriums, scheduled sanatorium and resort therapy, as well as other medical and health-improving measures, have become mandatory in flight services.

It is also important that the work of aviation physicians at Aeroflot enterprises is also well-equipped from the standpoint of methodology, which helps them solve not only concrete problems of medical practice, but problems of training flight personnel to monitor their own health and properly follow medical recommendations. Brochures, posters, movies and various other aids dealing with aviation medicine service these purposes.

However, the sophistication of modern technology, as well as the increased intensity and speed of flights have rendered flight work even more intensive. Pilots perform actions at some phases of flight at a rapid rate, in strictly limited time, with increased nervous-emotional tension. This increases significantly the requirements as to pilot work capacity and reliability of the crew, which means that there must be some revision of the methods, style and standards referable to the work of an aviation physician.

In the first place, these specifics require that the aviation physician have more precise knowledge about the flying profession. Let us consider, for example, his participation in analysis of erroneous actions of flight personnel. Of course, a physician should not and cannot replace, let us say, the flying instructor. But the latter is often unable to select the effective measures for prevention of the errors analyzed without learning about the psychophysiological mechanisms of mistakes and knowledge of individual distinctions of a particular pilot, as well as his health status in some cases. The pilot-instructor does not always receive the necessary assistance from a physician to solve this problem, and sometimes this is instrumental in recurrence of the crew's mistakes.

The physician in an aviation group is a representative of the most humane profession--medicine. However, he must be able to combine concern about the health of each aviator and care about his professional future and longevity in flight work with constant concern about flight safety. The aviation physician, acting in the interests of the flight team, must base himself not only on the traditional methods of aviation medicine at his disposal, but also take on everything new and progressive in this field. This is attributable to a number of circumstances: appearance of an enormous amount of new and potent pharmacological agents, broad introduction of new technology for medical examinations, significant improvement of medical knowledgeability of flight personnel and their families, etc.

However, along with their definitely positive significance, these phenomena also have some costly aspects: they alter certain traditional approaches of physicians to patients, affect the relations between physician and patient. Thus, the existence and popularity of potent pharmacological agents could sometimes cause greater harm to a patient than his disease. The specifics of the flying profession do not tolerate independent choice of drugs for treatment, since they could contain substances that are not admissible for intake by crew members.

Also, the wide use of technical equipment for patient examination, so to speak, separates the patients from the physician or, in the terminology of Academician Ye. Chazov, dehumanizes medicine. Moreover, performance of many rapid medical tests (for example, preflight examination) could create a simplified conception of the purpose and methods of preflight medical examination.

When flight personnel have some medical knowledge, they could try to decide themselves which drugs should be prescribed, which procedures ordered, to which sanatoriums they should be referred, etc. Not infrequently, these attempts are governed only by a certain medical fashion and, unfortunately, physicians do not always maintain the proper tactics of behavior with a patient, and for this reason cannot explain the correct view on this score.

On what should the aviation physician base his work at the present time? We believe that the best answer is the thesis advanced by Academician Ye. Chazov. Namely, with the rapid development of medicine and its technologization, the physician should, as before, direct himself toward the constant "everlasting truths": attentive examination and observation of the patient, thorough knowledge about his individual distinctions, adherence to special medical tactfulness in all circumstances and validation of each medical examination.

The physician of a flight group, who is often also the physician of the aviation enterprise, has the opportunity of observing a given pilot and his family for a long period of time. In this respect, he has definite advantages over the specialist physician with regard to proper interpretation of findings and administration of prompt preventive measures.

The special skill of an aviation physician should consist of a proper combination of goodwill toward flight personnel, ability to understand their concern about the decision, if indeed it is necessary, that a pilot must be partially or totally disqualified for some medical reasons. But, in such cases, the physician should be among the first to offer moral and administrative help in the search for a different job, therapeutic methods to restore his professional form. Or, finally, he should be the one to simply say that by no means is everything lost, that the pilot's physical condition by no means hinders successful work in the aviation group in the future, that he is essentially healthy according to the usual standards and has a good future.

There are instances when a pilot has difficulty in passing through the VLEK [medical flight certification commission] or is grounded for several months. Not infrequently, he then finds himself beyond the field of vision of the physician and is left without the necessary moral support and constant medical care. This is absolutely inadmissible, since most diseases, including cardiovascular (particularly cardiac ischemia), are reversible at the early stage. A proper regimen, physical conditioning and qualified prescription of the necessary drugs can be quite effective in such cases provided the course of therapy is administered at the proper time.

Unfortunately, aviation physicians sometimes forget that a pilot, like any person, could be sick, not feel well and give in to a poor mood, that with age, he grows older, like everyone. And this is a real fact that one cannot fail to take into consideration. For this reason, a pilot is entitled to promptly and frankly inform the physician and commander of the flight subunit (podrazdeleniye] about his malaise. And this must not be associated with any adverse consequences for him. Ultimately, it is necessary to work out optimum solutions for this problem, and this will unquestionably eventually serve the cause of preserving qualified flight personnel, which also means flight safety.

Apparently, it is now time to also revise the functions of flight preventoriums that could be used for specialized physical and certain types of psychological conditioning, more active and interesting forms of recreation for aviators, in addition to their health-improving role. This matter should become the topic of special studies by scientific and methodological institutions of the civil aviation, as well as specialists in the flight and medical services.

The sanatorium and resort bases of Aeroflot are used quite extensively to improve the health of flight personnel and will be used more and more in the future. But this must not replace, let alone preclude, the use of simpler and more reliable methods of improving the health of flight personnel, for example, regular jogging at a tolerable pace in the parks that are next to the enterprise. In some cases, this is better than referring a pilot to a specialized therapeutic and preventive institution, which is usually located in another climate zone.

Thus, at the present time there is an urgent need to refine the style and methods of aviation physicians, as well as to additionally develop new and more active forms of their work consistent with the specifics of flight work with modern technology. First of all, it is imperative to make wiser use of the current achievements of medical science, take fuller consideration of the sociopsychological specifics of aviation personnel. It is only on such a basis that an aviation physician can render comprehensive and real care to flight personnel, it is only on this basis that genuine trust can be formed between the physician and pilot.

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CSO: 1840/999

UDC 61.616-082

CENTRALIZATION OF SPECIAL MEDICAL CARE

Moscow GORODSKOYE KHOZYAYSTVO MOSKVY in Russian No 3, Mar 81 pp 21-22

SOKOLOVA, A. F., head of Public Health Department of Oktyabr'skiy Rayon [Moscow]

[Abstract] This is a survey of achievements in Oktyabr'skiy Rayon in the area of implementing government directives dealing with improvement of public health care and meeting the citizen's needs in all forms of care. There are 51 health-related institutions in this rayon, including specialized offices of genetic pediatric pathology (headed by Prof Yu. I. Barashnev), audiometry (Ariadna Pavlovna Kosacheva), otology (Nataliya Alekseyevna Lyalina), preschool and school facilities for deaf children, which are all part of the medical genetics center; biochemical laboratory, functional diagnostics department, consultant diagnostics office, acuppuncture, psychotherapy and other offices. Several case histories are described to illustrate the effectiveness of specialized forms of care. How this care was implemented, offices manned and equipped is discussed to some extent. Plans for a cardiology service are currently under discussion. Photos 3.
[16-10,657]

UDC 577.15.013.07: 582.282.195.23

IDENTIFICATION OF UBIQUINONES IN CERTAIN INDUSTRIAL MICROORGANISMS

Moscow PRIKLADNAYA BIOKHIMIYA I MIKROBIOLOGIYA in Russian Vol 17, No 5, Sep-Oct 81 (manuscript received 30 Mar 81) pp 720-723

KOGAN, L. M., OBOL'NIKOVA, Ye. A., ZAMUREYENKO, V. A., USTINNIKOV, B. A., MUZYCHENKO, L. A., LEVONCHUK, I. G., MINTS, Ye. S. and SAMOKHVALOV, G. I., All-Union Scientific Research Vitamin Institute, Moscow

[Abstract] In connection with the usefulness of ubiquinone-10 (CO-Q_{10}) as a cardiotonic, the possibility of using waste from other microbiological production procedures to obtain ubiquinones was investigated by determining the ubiquinone content in vat-grown cultures of Candida arborea and Candida utilis; in Aspergillus niger (a critic acid producer), Aspergillus awamori and Endomycopsis bispora (producers of glycoamylase), and Micrococcus glutaminis (a producer of lysine). These microorganisms are distinguished by the fact that when they are used in industrial processes the biomass is waste. Analysis of these biomasses was done by a modified version of the thin-layer chromatography method of Crane. Mass spectra of eluates separated from the lipid fraction were studied using a JMC-01SG-2 mass spectrometer. Molecular weights and structures of the ubiquinones were determined. Aspergillus niger was found to contain Co-Q_9 and a small quantity of its homologue with a shorter side chain; A. awamori was also shown to contain Co-Q_9 but no homologues were present. The strain of Endomycopsis bispora studied contained only

Co-Q_8 (Yamada et al have earlier found also Co-Q_7 and Co-Q_9; this may be because of taxonomic discrepancies). M. glutamis contained Co-Q_9 and small amounts of Co-Q_{10}. Most of the Candida strains studied contained CO-Q_9. The presence of CO-Q_7 in C. utilis, found in an earlier study, was confirmed; small amounts of higher homologues were also found in the biomass of this strain. It is suggested that Aspergillus awamori can be used if required as a source of Co-Q_9 since it contains no homologues. References 15: 1 Russian, 14 Western.
[14-9642]

UDC 616-091:61.007

ESTABLISHED COMPLEMENT OF MEDICAL PERSONNEL IN PATHOLOGIC ANATOMY DEPARTMENTS OF TREATMENT AND PROPHYLACTIC ESTABLISHMENTS FOR ADULTS

Moscow ARKHIV PATOLOGII in Russian Vol 43, No 10, Oct 81 pp 78-80

KAZANTSEVA, I. A., ROGOVOY, M. A., VIKHERT, A. M., MAKINSKIY, T. A. and GRISHELEVICH, T. A., USSR Academy of Medical Sciences Institute of Human Morphology, USSR Ministry of Health All-Union Scientific Research Institute of Social Hygiene and Public Health Organization imeni N. A. Semashko, USSR Academy of Medical Sciences All-Union Cardiological Center

[Abstract] The increasing volume and complexity of pathologic anatomic studies done in the USSR prompted a detailed analysis of the work of personnel in pathology departments at health care facilities with a view to updating the established staff needed to complete necessary work. The work of pathologic anatomists is divided into three main areas: autopsies, histologic and histochemical studies, and other activities. A statistical breakdown is shown for the amount of work one pathologist can do in one year. The work of laboratory and other personnel is similarly examined. It is concluded from the analysis that in order to improve the operation of pathology departments it is necessary to introduce round-the-clock shift work for some categories of medical personnel. The figures arrived at have been presented to the USSR Ministry of Health for confirmation. No references.
[66-9642]

UDC 616.981.553-036.22-078.7:853

ADVANCES AND PROSPECTS FOR STUDY OF ARBOVIRAL INFECTIONS IN KAZAKHSTAN

Alma-Ata ZDRAVOOKHRANENIYE KAZAKHSTANA in Russian No 7, Jul 81 pp 27-28

TEMIRBEKOV, Zh. T., Kazakh Scientific Research Institute of Epidemiology, Microbiology and Infectious Diseases

[Abstract] The most dangerous arboviral infections that include tick-borne encephalitis and Crimean hemorrhagic fever were studied in Kazakhstan. The phases and prospects for study of these types of human pathology were studied over a period of 40 years. The first representatives of Alma-Ata seasonal encephalitis, which is an arboviral infection found in Kazakhstan, were investigated in 1935 in individual focal areas of the infection in the vicinity of Alma-Ata. Diseases caused by tick-borne encephalitis were later recorded in areas of the forest-steppe, foothills and mountain zones of Kazakhstan. Crimean hemorrhagic fever shows a marked summer seasonality during May to August. This is associated with the seasonal activity of ticks of genus Hyalomma that are the main vectors of the pathogenic agent of this disease. The natural focal areas of tick-borne encephalitis and Crimean hemorrhagic fever were inhomogeneous due to the variety of biocenotic contacts of background species of Ixodid ticks that are the main vectors of the infections. Antibodies of humans and domestic animals have been determined to some new strains of arboviruses, although the epidemiological significance of these viruses has not been fully studied.
[360-6521]

UDC 612.886-07

VESTIBULAR STABILITY AND SOME PHYSIOLOGICAL PARAMETERS OF SEAMEN EXPOSED TO CORIOLIS ACCELERATIONS

Kiev ZHURNAL USHNYKH, NOSOVYKH I GORLOVYKH BOLEZNEY in Russian No 5, Sep-Oct 81 (manuscript received 14 Apr 81) pp 12-16

MARKARYAN, S. S. and KOROTKOV, Yu. A., Laboratory of Noise and Vibration (headed by I. I. Varenikov), Scientific Research Institute of Maritime Transport Hygiene, USSR Ministry of Health

[Abstract] This study was conducted because of reports that prolonged exposure to the intensive noise and vibration inherent on ships leads to specific damage of the acoustic analyzer. On-shore studies were made of degree of stability of vestibular analyzer and physiological reactions of subjects with different vestibular stability on a group of 209 seamen in different occupations, on the basis of continuous accumulation of Coriolis accelerations generated by rotating subjects in a Barany chair or electric revolving chair, turned at the rate of 180°/s, with concurrent inclination of the head toward the shoulders at an angle of 30°.

Vestibular stability was graded on a four point scale: 1, 2, 3--degrees of stability (first group) and 4--vestibular instability (second group), the latter constituting 23.2% of the subjects tested, although there was about the same number of unstable subjects in groups classified according to work tenure and age. Grade 4 seamen working in the engine room presented more marked decline of pulse pressure, greater elevation of minimum arterial pressure as a function of tenure, as compared to deck hands, and as compared to seamen with grades 1, 2, 3 stability of the vestibular analyzer. It is suggested that it is important to test vestibular functions of seamen in order to work out preventive measures against disturbances thereof. References 20: 17 Russian, 3 Western.
[32-10,657]

UDC 612.115:543.865+547.995

ROLE OF COMPLEX COMPOUNDS OF HEPARIN WITH PROTEIN AND AMINES AT EARLY STAGE FOLLOWING ARTIFICIAL-HEART IMPLANTATION IN CALVES

Moscow BIOLOGICHESKIYE NAUKI in Russian No 5, May 81 (manuscript received 1 Feb 80) pp 62-65

LYAPINA, L. A. and KOVALEVA, T. N., article recommended by the Laboratory of Physiology and Biochemistry of Blood Clotting, Moscow State University imeni M. V. Lomonosov

[Abstract] A Modul' artificial heart machine, with pneumatic system for control of cardiac function, and extracorporeal circulation machine with roller pump and two foam-film oxygenator were used in experiments on 15 calves of both sexes, 3-4.5 months old weighing 90-100 kg. The animals were divided into 3 groups (1--experiment discontinued due to thrombotic complications, 2-- due to hemorrhage and 3--due to equipment malfunctions), and in all cases the following were tested: nonenzymatic fibrinolysis, complex compounds of heparin with fibrinogen, epinephrine, plasminogen and plasmin whose nonenzymatic fibrinolytic activity was tested on unstabilized fibrin plates, as well as overall fibrinolytic activity. After the experiments, protamine sulfate in a ratio of 1:4 with heparin was injected to neutralize heparin excess. The findings suggest that impaired complex formation between heparin, blood proteins and amines is the cause of impairment of hemostasis at the early posstransplantation stage: the levels of complex heparin compounds diminished, even disappearing, in the presence of thromboses, whereas in the case of hemorrhages there was a more intensive process of complex formation. References 13: 9 Russian, 4 Western.
[38-10,657]

PHYSIOLOGY

UDC: 615.849.11.015.4:612.014.426

BIOTROPIC PARAMETERS OF MAGNETIC FIELDS

Moscow VOPROSY KURORTOLOGII, FIZIOTERAPII I LECHEBNOY FIZICHESKOY KUL'TURY in Russian No 3, May-Jun 81 (manuscript received 2 Feb 81) pp 61-63

[Article by M. A. Shishlo, Central Scientific Research Institute of Resort Therapy and Physiotherapy, Moscow]

[Text] The use of magnetic fields (MF) in biology and medicine to control biological systems has led to appearance of the term, biotropic parameters of MF. They include the physical characteristics of MF, which determine the primary biologically significant physicochemical mechanisms of field action causing formation of corresponding reactions on the level of the integral organism. These parameters include MF intensity, gradient, vector, pulse frequency and shape, and duration of exposure.

Factors that elicit responses by the biological system include such parameters of MF interaction with the integral organism as localization of exposure and volume of tissues interacting with the field, as well as the initial state of the organism (Yu. A. Kholodov and M. A. Shishlo; G. F. Plekhanov).

In essence, the findings of experimental studies of biotropic parameters of MF make it possible to control physiological processes and will aid in optimizing methods of MF therapy. We shall cite a few examples.

R. P. Kikut has shown that when blood moves in a constant MF there is induction of electromotive force (EMF), with conditions for thrombosis created in the region of positive potential and thrombolysis in the region of negative potential. In this phenomenon and method of treating vascular aneurysms developed on its basis, of prime importance are two biotropic parameters of the constant MF: stability of orientation of V [or B?] vector in space and field intensity. The former makes it possible to create conditions for thrombosis in the region of the aneurysm, while the latter induces a certain EMF, which elicits changes in the blood clotting system.

There is no thrombus formation in an intact vessel, even with a stationary MF of 200-300 mT, and this is indicative of the important role of turbulence of blood movement in the aneurysm to thrombus formation.

The phenomenon demonstrated by R. P. Kikut shows that the vector nature of stationary MF is indirectly reflected in the opposite effects of positive and negative potential of induced EMF in the blood clotting system. At the same time, there has not been theoretical or experimental validation heretofore of the difference between direct influence of the magnetic component of the north and south poles of the magnet on biological systems. Until recently, it was considered that such formulation of the question was generally incorrect in the case of equality of all characteristics of MF at the south and north poles. However, after the basic discovery of weak electromagnetic interactions in physics, this problem has undergone development. It has already been formulated in biology (V. Zhvirblis), but it is apparently premature to discuss its applied (medical) aspects. We can only expect that the direct effects of the south and north poles of the magnet will be "weak" in the full sense of the word, and for this reason will be manifested in biological systems over relatively long periods of time, statistically demonstrable only with large and homogeneous samples.

The heterogeneity of a stationary MF and its distribution in space (topography) are important as a biotropic parameter. Let us consider the situation where blood moving in a vessel crosses a stationary MF from a series of independent sources with opposite orientation of their poles. Then, provided certain conditions are met, a variable EMF will be induced, the frequency and form of which are determined by the velocity of blood and topography of the field, in an elementary volume of blood ΔV, crossing over the force lines of the stationary MF. Thus, one can generate variable EMF in the moving flow of blood by means of stationary MF and, apparently, effectively alter its clotting system.

In alternative MF, frequency is the most important biotropic parameter. The low-frequency range of electromagnetic fields (from 0 to $1 \cdot 10^{3} - 1 \cdot 10^{4}$ Hz) is used in magnetotherapy, in which one can treat with the magnetic and electrical components separately without appreciable thermal effects in the presence of the actual levels of field intensity.

Studies of sensory evidence of pulsed MF in humans revealed that of the set of frequencies of 1, 10, 100 and 1000 Hz, 10 Hz demonstrated the most biological activity. In electromagnetic biology, such phenomena were named the frequency "window." The same effect is observed in studies of the biological effect as a function of MF intensity--the amplitude window. Frequency and amplitude "windows" are observed both in the whole organism and on the cellular-tissular level; they are inherent in the so-called informational type of interaction between the factor and living organisms (Yu. A. Kholodov and M. A. Shishlo).

The localization of treatment plays a special role in interaction between a physical factor and the organism. We shall cite only a few examples from the field of magnetotherapy.

Formation of the adaptive activation reaction is the most effective with exposure of the head, rather than the human body, to variable MF (Ye. V. Kvakina et al.). On the other hand, biologically active points acquire definite significance to local delivery of MF.

Experimental studies are often conducted in such a way that animals are wholly exposed to MF. Under such conditions, alternating MF of 50 Hz, of the order of 20-30 mT, cause marked morphofunctional changes in a number of organs that are of a deleterious nature. At the same time, clinical use of variable MF of 50 Hz, of the order of 18-36 mT, generated by a Polyus-1 unit did not elicit such adverse effects. Experimental and clinical findings indicate that not only localization, but volume of tissues interacting with MF play an important part in forming the body's reactions (M. A. Shishlo et al.).

Investigation of this matter leads to the conclusion that there must be some minimal volume of tissues interacting with MF , with which there would be formation of a general reaction by the whole organism. The more effectively the energy of the physical factor is absorbed, the smaller this volume can be. The amount of absorbed energy is quite small under the influence of a low-frequency variable MF (G. F. Plekhanov), so that the role of volume interacting with the factor increases substantially under the influence of MF, as compared to more powerful penetrating factors whose energy is effectively absorbed in tissues (UHF electric field, microwaves and others). With decrease in penetrating capacity the factor acquires the role of surface area interacting with it. For this reason, solenoids and magnetic installations with large net volume are more effective as therapeutic agents.

Thus, formation of general adaptive reactions of an organism depends largely on the volume of tissues interacting with MF. At the same time, the primary physicochemical mechanisms of MF action and, consequently, local reactions of the organism are determined by the physical parameters of the MF used.

A comparison of these patterns enables us to approach a solution to the problem of correlation between local and general adaptive reactions to MF and eliminate a number of diverging effects compared only by intensity of the MF that induce them.

It is also important that, when using inductor electromagnets, an increase in MF intensity usually increases the volume of tissues interacting with it. For this reason, when studying therapeutic effects as a function of MF intensity under clinical conditions, particularly with small inductors, it becomes necessary to take into consideration the coordinated changes in biotropic parameters when one of them is altered.

Units for Measurement of MF Intensity and Gradients, and Some Questions of Terminology*

There is a parameter called intensity I characterizing the intensity of MF in vacuum. In the centimeter-gram-second system, the oersted (Oe) is used for this and in the SI system, intensity of MF is measured in amperes per meter (A/m).

$$1\ \text{Oe} = \frac{1000}{4\ \text{P}} = 79.58\ \text{A/m}$$

In practice, it can be considered that 1 Oe = 80 A/m. The direction from the north pole to the south pole is arbitrarily considered to be the positive direction of vector I in the environment.

To describe the intensity of MF in matter there is parameter V [or B]--magnetic induction, which is measured in gauss (G) in the CGS system and in tesla (T) in the SI system. $1\ \text{T} = 1 \cdot 10^4\ \text{G}$. In practice, the millitesla has gained wide use--1 mT = 10 G.

Magnetic induction can be presented as $V = \mu_0 \mu I$, where μ_0 is magnetic penetration of vacuum and μ is magnetic penetration of matter measured in relation to vacuum. In the CGS system, magnetic penetration of vacuum μ_0 equals 1; for this reason, there is quantitative equality in this system between the units of induction and intensity of MF (oersted and gauss). In the SI system, μ_0 differs substantially from 1, and for this reason no such equality exists between I and V units.

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*The editorial board deemed it necessary to add this appendix to the article by M. A. Shishlo.

At the present time, a transition is taking place to the SI system, and for this reason it is desirable to express MF intensity in amperes per meter and induction in tesla (or millitesla). Since there is equality in the CGS system between the units, oersted and gauss, in practice this makes it possible to convert oersted units directly into millitesla using the above equation.

The MF gradient in space is an important biotropic parameter, and it is expressed as $\Delta V/\Delta g$, i.e., it characterizes a change in intensity of MF (ΔV) in space (Δg) and is usually measured in millitesla, or in gauss per cm (mT/cm, G/cm), or as a percentage of mean measured value. It is desirable to indicate, particularly in experimental studies, the distribution of gradients in different directions.

In studies dealing with MF, preference should be given to concepts of MF and its magnitude and intensity, and refer to depth of penetration of MF, rather than magnetic induction.

When using intermittent variable MF generated, in particular, by the Polyus-1 unit, the concept of "continuous" is sometimes referred to by the word "stationary," which leads to appearance of such terms as "stationary variable magnetic field." It would be desirable to adhere to long-established concepts and terms. Thus a stationary MF is a field whose vector V is stationary (constant) in time, with regard to magnitude and direction at each point in space where the MF of some external source is recorded. The term, "continuous variable magnetic field" refers to the continuity of generation of variable MF in time. The concept of "intermittent variable magnetic field" is close to the concept of "pulsed magnetic field," and its appearance is related to the technical aspect of generation of such fields.

BIBLIOGRAPHY

1. Plekhanov, G. F., editor, "Introduction Into Electromagnetic Biology," Tomsk, 1979.

2. Zhvirblis, V., KHIMIYA I ZHIZN', No 7, 1979, p 7.

3. Kvakina, Ye. B., Kotlyarevskaya, Ye. S., Kvakin, S. D., et al., NOVOSTI MED. PRIBOROSTROYENIYA, No 3, 1971, p 73.

4. Kikut, R. P., in "Reaktsii biologicheskikh sistem na magnitnyye polya" [Reactions of Biological Systems to Magnetic Fields], Moscow, 1978, p 149.

5. Kholodov, Yu. A., and Shishlo, M. A., "Electromagnetic Fields in Neurophysiology," Moscow, 1979.

6. Shishlo, M. A., Zagorskaya, N. Z., and Korolev, Yu. N., in "Magnitobiologiya i magnitoterapiya v meditsine" [Magnetobiology and Magnetotherapy in Medicine], Vitebsk, 1980, p 191.

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10,657
CSO: 1840/13

ANALYSIS OF RETINAL FUNCTION TO DISTINGUISH CONTOUR SIGNAL

Moscow BIOFIZIKA in Russian Vol 26, No 5, Sep-Oct 81 (manuscript received 23 Apr 80) pp 860-863

LEBEDEV, D. G., Institute of Problems of Information Transmission, USSR Academy of Sciences, Moscow

[Abstract] A model is described of the human optical system as it relates to discrimination of (Laplacian) object contours based on lateral inhibition. Formulas are offered which take into consideration the coefficient of transformation of photic energy into an electric signal, Laplacian variance, drift of visual axes of the eye, and the different receptors of images. Calculations are illustrated by 13 equations demonstrating that a system with the above-mentioned drift behaves actively in the presence of retinal defects referable to perception of image outline signals. References 2 (Russian).
[17-10,657]

UDC 616.72/13-008.66-005.4-092:612.821.1

INTERHEMISPHERIC INTERACTION IN PATIENTS WITH UNILATERAL VASCULAR LESIONS TO SENSORIMOTOR STRUCTURES, ACCORDING TO MOTOR REACTION TIME

Kiev FIZIOLOGICHESKIY ZHURNAL in Russian Vol 27, No 4, Jul-Aug 81 (manuscript received 26 Mar 80) pp 554-556

TORDIYA, G. D., Institute of Gerontology, USSR Academy of Medical Sciences, Kiev

[Abstract] A study was made of 11 right-handed patients with residual signs of acute cerebrovascular disorder in the left or right central cerebral artery, with central hemiparesis and hemihypesthesia. A Center-2 neuroflexometer was used to test simple motor reaction time in a dark sound-proof chamber during electrical stimulation of fingers of both hands, the tests being made for 3 days, with 80-100 readings per series, 2 series of tests per day, and with determination of reaction time difference between hands. While there were no differences in reaction time of patients who had suffered a cerebrovascular accident and healthy controls, the difference in reaction time was nil or even negative in the patients. It is suggested that in cva victims there are no transcallosal fibers in the pathway of the nervous process to produce the difference between reaction time of healthy and involved sides. Figures 1; references 11: 9 Russian, 2 Western.
[27-10,657]

UDC 576.12 + 591.186

COMPARATIVE PHYSIOLOGICAL ANALYSIS OF STAGES IN EVOLUTION OF SLEEP AND MECHANISMS OF ITS REGULATION

Moscow USPEKHI FIZIOLOGICHESKIKH NAUK in Russian Vol 12, No 2, Apr-Jun 81 pp 3-19

KARMANOVA, I. G., KHOMUTETSKAYA, O. Ye. and SHILLING, N. V., Institute of Evolutionary Physiology and Biochemistry imeni I. M. Sechenov, USSR Academy of Sciences

[Abstract] Laboratory studies were done on sleep patterns and mechanisms in vertebrates and compared with published work. Species studied included: fish (Ictalurus nebulosus, Squalus acanthias, Dasyatis pastinaca, Mugil sp., Sciaena umbra, Scorpaena porcus, Gaidropsarus mediterraneus), amphibia (Rana temporaria, Rana ridibunda), reptiles (Emys orbicularis, Varanus griseus), birds (Nyctea scandiaca, Strix aluco, white Leghorn). Neurophysiological investigations were conducted throughout the waking and sleeping periods using electroencephalogram, electrooculogram and electromyogram recordings. Mechanisms involved in the various forms of sleep in homoiothermic and poikilothermic vertebrates were compared in intact specimens and specimens with destroyed cerebral structures. Findings showed that functional analogues exist between the sleep of warm-blooded and cold-blooded vertebrates: "primary sleep" in fish and amphibia, consisting of three forms of sleeplike rest and "intermediate sleep" in reptiles, progressively developing in the phylogeny of vertebrates. The results of this research could be of practical significance in the identification of disorders in slow-wave and paradoxical sleep observed in various pathologies of the central nervous system. Figures 3; references 108: 44 Russian, 64 Western.
[11-9642]

UDC 616.45-001.1/.3-02: 613.863-07: 616.831-008.944.52-074

BRAIN CATECHOLAMINES IN EXPERIMENTAL EMOTIONAL STRESS

Moscow USPEKHI FIZIOLOGICHESKIKH NAUK in Russian Vol 12, No 2, Apr-Jun 81 pp 67-90

BELOVA, T. I. and KVETNANSKY, R., Institute of Normal Physiology imeni P. K. Anokhin, USSR Academy of Medical Sciences, Moscow; Institute of Experimental Endocrinology, Slovak Academy of Sciences, Bratislava.

[Abstract] Recent work on the role of brain catecholamines and catecholamine-synthesizing enzymes in stress is reviewed. Cerebral sites of norepinephrine, epinephrine and dopamine synthesis and of synthesizing enzymes for these catecholamines are examined; most enzyme activity takes place in areas where neurons having an enzyme-positive reaction are located. The role of experimental stress and hypertension in altering the concentration of catecholamines and their enzymes is discussed. Animal experiments to clarify changes in the levels of the cerebral catecholamines in measured stress are described. Figures 3; references 58: 7 Czech, 6 Russian, 45 Western.
[11-9642]

SUPERSENSITIVE MAGNETOMETRY AND BIOMAGNETISM

Moscow PRIRODA in Russian No 7, Jul 81 pp 23-31

VVEDENSKIY, V. L. and OZHOGIN, V. I., Laboratory of Physical Properties of Materials, Institute of Atomic Energy imeni I. V. Kurchatov, and Chair of Solid-State Physics, Moscow Institute of Radio Engineering, Electronics and Automation

[Abstract] The various applications of the Superconducting Quantum Interference Device (SQUID) were investigated with respect to detection of biomagnetism in the human body. Magnetic fields in the living organism can be induced by ion currents arising due to the electrical activity of cellular membranes such as muscle and nerve cells, fine ferromagnetic particles that are in the organism or specially introduced into it and the inhomogeneities of the susceptibility of different organs manifested only when an external magnetic field is applied. SQUID-magnetometers are used in producing magnetocardiograms similar to electrocardiograms, in detecting ferromagnetic particles in the organism, in detecting the magnetic fields of the internal organs, skin, muscles and eyes and in magnetoencephalography. Other biological objects such as animals, plants, textile crops and others can be studied by using SQUID-magnetometers. These magnetometers can also check the chemical purity of various crucial parts, the homogeneity of the composition and the absence of internal disturbances. SQUID magnetometers and other devices that utilize the Josephson effect are employed in low-temperature experiments of many physics laboratories. Figures 6; references 4: 3 Russian, 1 Western.
[359-6521]

UDC 616.834.191-008.931: 577.152.1]-02: 613.863-092.9

CHANGE IN GLUTAMATE DEHYDROGENASE ACTIVITY IN NEURONS OF GANGLION NODOSIUM IN RABBITS IN ACUTE EXPERIMENTAL EMOTIONAL STRESS

Moscow BYULLETEN' EKSPERIMENTAL'NOY BIOLOGII I MEDITSINY in Russian Vol 92, No 10, Oct 81 (manuscript received 10 Apr 81) pp 494-496

GONCHARUK, V. D., Institute of Normal and Pathological Physiology imeni P. K. Anokhin, USSR Academy of Medical Sciences, Moscow

[Abstract] Glutamate dehydrogenase activity was studied in the ganglion inferius nervi vagi in acutely stressed rabbits using the histochemical method with nitro blue tetrazolium in the modification of Rubinstein (1962). It was found that, in contrast to controls, the activity of the enzyme in experimental animals correlated with the size of the cells: the greatest increases in activity were seen in medium and small cells; the differences were small. Results are discussed with reference to the tricarboxylic acid cycle. Figures 2; references 8: 6 Russian, 2 Western.
[64-9642]

UDC 612.825

MECHANISMS OF SONIC SIGNAL CODING IN THE COCHLEA

Kiev ZHURNAL USHNYKH, NOSOVYKH I GORLOVYKH BOLEZNEY in Russian No 5, Sep-Oct 81 (manuscript received 18 Apr 81) pp 21-26

POPOV, Yu. V., Laboratory of Biophysics (headed by E. A. Bakay, candidate of medical sciences), Kiev Scientific Research Institute of Otolaryngology imeni A. I. Kolomiychenko

[Abstract] This is a survey of existing theories (telephone, resonance, traveling and stationary waves) of sound coding in the cochlea, with traveling wave theory being the best validated experimentally. However, even the latter involves some questions that require additional hypotheses, one of which is based on the principle of "volleys," but is unlikely. Since presence of resonances has been proven, it is assumed that there is another mechanism in addition to traveling waves involved in transformation of acoustic signals: when a harmonic signal is delivered to the vestibular fenestra it will propagate at the rate of sound in perilymph (about 1454 m/s) along the main membrane and elicit oscillations in the resonance system whose intrinsic frequency equals the frequency of the stimulus. The mechanisms include the one of coding the beginning and end of a signal, which is necessary because of the duration of oscillatory processes in the cochlea even in response to brief acoustic stimuli (for example, the response lasts about 5 ms in response to an 0.1-ms acoustic pulse). It is theorized that the plane of propagation of the traveling wave is perpendicular to the plane of oscillations of the resonant segment of the main membrane; the basilar membrane of the cochlea is, as believed by Helmholtz, a set of parallel filters that separate complex acoustic signals into harmonic components; there could be coding of both frequency and time parameters of acoustic signals in the cochlea. Figures 4; references 9 (Western).
[32-10,657]

RADIATION BIOLOGY

UDC: 617-001.28-07:616.419

POSTRADIATION RECOVERY OF HUMAN BONE MARROW, AND MORPHOLOGICAL DYNAMICS OF UNDIFFERENTIATED CELL POOL

Moscow TERAPEVTICHESKIY ARKHIV in Russian Vol 53, No 9, Sep 81 (manuscript received 28 May 81) pp 127-131

[Article by L. A. Suvorova, N. A. Vyalova, A. V. Barabanova, G. P. Gruzdev (Moscow)]

[Text] Because of the rare cases of acute radiation sickness and great polymorphism of lesions elicited both by the different forms of radiation and distinctions of spatial distribution of dose in the body, radiation hematology does not yet have full enough information about postradiation repair of hemopoietic function in man.

There is a conception that the process of postradiation changes includes a number of consistently demonstrable correlations in morphology of bone marrow and kinetics of peripheral blood cells. One can arbitrarily distinguish the following successive phases: degenerative-necrotic (in bone marrow)--latency period in peripheral blood ending with primary decrease in leukocyte count; abortive increase in granulocyte content of bone marrow, of leukocytes, thrombocytes and reticulocytes in blood (demonstrable primarily in the dose range of 2-4 Gy), secondary depletion of bone marrow--agranulocytosis on the periphery, real recovery of bone marrow and blood (V. Bond et al.; M. D. Brilliant et al.).

When man is exposed to relative uniform and nonuniform radiation, the severity of damage to hemopoiesis, as well as time of occurrence of agranulocytosis, start and speed of true restoration of peripheral blood level, usually correspond to the mean absorbed dose to bone marrow as a whole. However, the conception exists in clinical practice that recovery of hemopoiesis after exposure of man to nonuniform gamma and gamma-neutron radiation occurs faster than after relatively uniform radiation in the same mean absorbed doses (A. K. Gus'kova and G. D. Baysogolov, 1971; A. I. Vorob'yev et al., 1974). It is assumed that this is attributable primarily to preservation of a considerable part of the hemopoietic stem cells in the less irradiated parts of bone marrow (V. Bond et al., G. S. Strelin and others).

The results of clinical follow-up of a group of subjects who had been exposed to uncontrolled radiation in accident situations were published in the Soviet literature: 1 patient was exposed to relative uniform gamma radiation (A. Ye. Baranov et al.), 8 to nonuniform gamma-neutron radiation in doses of the order of 2-5 Gy or more (A. I. Vorob'yev et al., 1973, 1974, 1976; A. K. Gus'kova et al., 1977; N. A. Vyalova et al.; V. I. Nesterova et al.).

We have tried to summarize the hematological data referable to the same clinical observations and offer details on histological structural distinctions of bone marrow, using quantitative characteristics to describe the behavior of different hemopoietic stem cells.

We examined 37 specimens obtained by trephination and 40 bone marrow specimens obtained by puncture from different points 24 h after irradiation, as well as on the 3d, 4th, 6th, 8th, 11th, 13th, 20th, 29th, 32d and 43d days of sickness. Some of the punctates were submitted to histological examination when they contained pieces of bone marrow.

> Pieces of bone marrow obtained from biopsy were fixed in 10% neutral formalin with subsequent decalcification in 20% trilon for 2-3 days. The pieces were then imbedded in celloidin-paraffin; sections 10 μm in thickness were stained with hematoxylin-eosin and azure-eosin. A differential count was made of cells in histological preparations, circumscribing the field of vision with a narrow slit, the length of which measured with an object micrometer constituted 140 μm, width was 30 μm and area of visual field $S = 0.0042\ \text{mm}^2$.
>
> Comparative analysis of the material was made on the basis of quantitative evaluation of cellular composition of bone marrow scaled to 1 mm^2 of the histological section. The method of quantitative analysis is described in greater detail in the article by G. P. Gruzdev et al. The morphological findings were compared to information on level of chromosomal aberrations in the same points (Ye. K. Pyatkin and A. Ye. Baranov) and results of physical dosimetry. Peripheral blood was analyzed daily.

On the basis of our observations, the processes of damage and recovery of bone marrow from acute radiation sickness induced by external radiation can be described as follows.

Already 1 day after irradiation, marked disorganization of bone marrow structure was demonstrated. A considerable part of the medullary sinusoids were dilated and plethoric, with hyperemia of bone marrow that was particularly marked in the parenchymal regions deprived of cellular elements. The bone marrow stroma was edematous. Overall cellularity of hemopoietic tissue diminished by 20-25% with exposure to radiation in a dose of 3-4 Gy and by 50% with exposure to more than 5 Gy (Figure 1a, insert [photo not reproduced]). The erythroid primordium was reduced to 30-50% and the granulocytic one narrowed down, mainly due to elements of the proliferative pool (myeloblasts, promyelocytes, myelocytes). There was no change in quantity of megakaryocytes; however, in some of these cells there were signs of degeneration (vacuolization of the nucleus and cytoplasm, pyknosis of nuclei). A significant amount of cells with grid-like ["target-like"] destruction of the nucleus was demonstrable in areas of destructively altered bone marrow.

The peripheral blood changes reflected progressive depletion of bone marrow due to reduction of the pool of proliferative cells. These changes are vividly illustrated by the leukocyte cruve and, primarily, dynamics of neutrophils. Figure 2, (a) and (b), illustrates the behavior of granulocyte and thrombocyte primordia in response to relatively uniform and nonuniform radiation in comparable average doses of the order of 4 Gy absorbed by bone marrow.

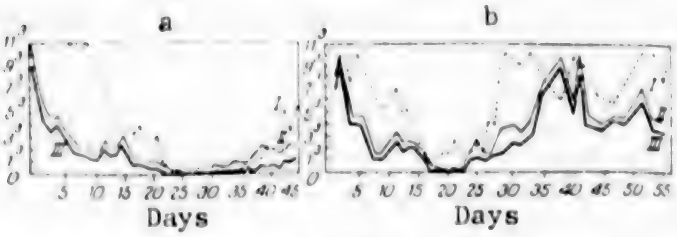

Figure 2.
Dynamics of peripheral blood in the presence of acute radiation sickness (4 Gy dosage)
a) relatively uniform gamma radiation
b) nonuniform gamma-neutron radiation
I) thrombocytes
II) leukocytes
III) neutrophils

In addition to degenerative changes in bone marrow, rather significant signs of regeneration appear already after 1 day. This applies, first of all, to 3-fold increase (in absolute value) in quantity of fibroblasts and macrophages. In spite of progressive depletion of bone marrow for 1 week, peripheral blood did not undergo substantial changes, with the exception of marked lymphocytopenia. After 8-10 days, sometimes less, depending on mean dosage and uniformity of radiation, primary decline of leukocytes and thrombocytes was noted in peripheral blood.

As indicated by the findings on punctates and trephinates, there was an increase in quantity of fibroblasts, osteoblasts, reticular cells, plasmocytes and macrophages, with signs of erythrophagia and leukophagia, in bone marrow. By the end of the week, the absolute quantity of plasma cells and macrophages was 10-15 times above normal. Apparently, proliferation of this group of cellular elements should be interpreted as a mandatory condition for postradiation repair of bone marrow, which provides for creation of the necessary cellular microenvironment. It is known that bone marrow monocytes and, perhaps, fibroblasts and osteoblasts are sources that produce colony-stimulating factor (Metcalf and Moore; Moore and Williams; M. Moore and D. Metcalf; I. L. Chertkov and A. I. Vorob'yev; I. L. Chertkov and A. Ya. Fridenshteyn). The next regular stage of repair of bone marrow parenchyma was the appearance of clones (collections) consisting of monomorphous lymphocytoid undifferentiated cells with a rather coarse hyperchromic nucleus and narrow band of cytoplasm, appearance of which was visually demonstrable on the 4th-6th day of sickness (Figure 1, б, в). Absence of signs of differentiation of these cells indicates that they have no direct bearing on the next phase of development of the hematological syndrome--abortive increase.

The stage of primary decrease in leukcoytes was followed by a phase of stabilization of peripheral blood, or temporary relative uneventfulness, which was named abortive elevation and has been described by many researchers (Bloom and Jacobson; Cronkite and Bond; G. P. Gruzdev; M. D. Brilliant et al., and others).

The old hypothesis, which explained abortive elevation as the consequence of accumulation of viable mutant cells, was not corroborated by cytogenetic studies of bone marrow.

In our opinion, the attempt made by Bond and Fliedner is more realistic: they attribute development of abortive increase to proliferation of semistem--committed cells. The degree of abortive increase depends primarily on the size of the dividing-maturing pool, i.e., recovery potential of cells. According to our assumption, the height and duration of abortive rise are determined by the number of cells remaining in bone marrow, which are more differentiated for primordial hemopoiesis, and this determines the brevity of this period. Thus, we found an increase in mitotic activity, dividing erythroblasts, myeloblasts and promyelocytes in the bone marrow of patients examined at this stage. As compared to previous tests, bone marrow trephinates showed an increase in primarily myelocytes, promyelocytes and myeloblasts. However, when the dosage of relative uniform irradiation of bone marrow exceeded 5-6 Gy, there was rapid progression of aplastic changes in bone marrow, and no abortive rise was noted in peripheral blood.

The size of the pool of undifferentiated cells had no effect on height and duration of abortive rise (see Figure 2, a and b; Figure 3, a and b). In the absence of abortive elevation of leukocytes in cases of severe radiation lesion (dosage to bone marrow ≥5 Gy), bone marrow also revealed clones of undifferentiated cells at the period of marked agranulocytosis (less than 500 cells/μℓ) in the blood stream.

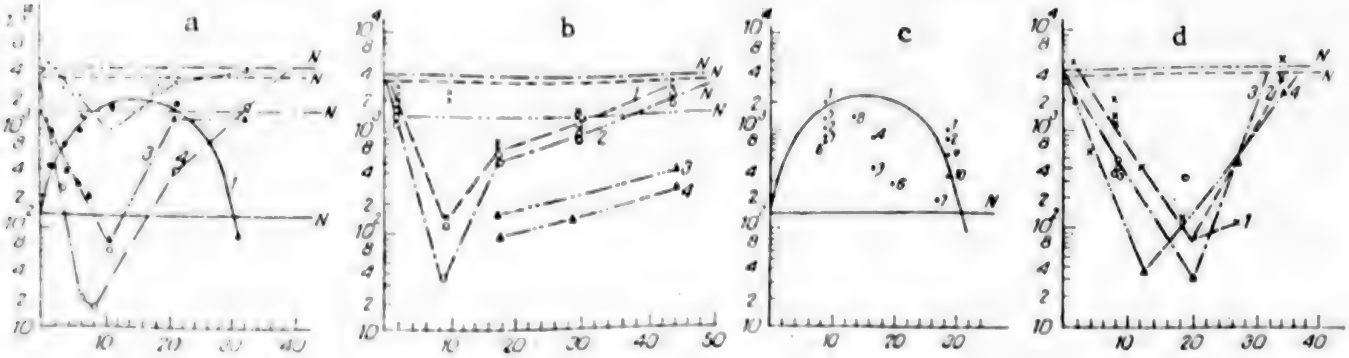

Figure 3. Changes in cellular composition of bone marrow after irradiation.
X-axis, postradiation days; y-axis, quantity of cells/μℓ

a) uniform gamma radiation, 4 Gy
  1) undifferentiated cells
  2) granulocytes
  3) elements of dividing-maturing pool of granulocyte primordium
  4) erythroid primordium
b) nonuniform gamma-neutron radiation, 3-4 Gy
  1) granulocytes
  2) erythroid primordium
  3,4) dividing-maturing granulocyte pool
c) undifferentiated cells (curve 4 Gy) at points:
  1,2) 3 Gy   3, 4, 9, 10) 4 Gy   5, 6, 7, 8) ≥5 Gy
d) nonuniform radiation ≥5 Gy
  1, 2) granulocyte primordium
  3, 4) erythroid primordium

Group analysis of quantitative parameters of different hemopoietic primordia, including the pool of undifferentiated cells, exposed to the same local radiation convinced us that there was a definite pattern to the change in cytological composition of bone marrow undergoing repopulation. Thus, regardless of the degree of uniformity of radiation, the amount of undifferentiated cells increased as a function of time and reached a maximum on about the 14th-20th day of sickness in the examined segments of bone marrow exposed to a comparable dose of radiation (see Figure 3, a and b). The decrease in number of undifferentiated cells was associated with increase in volume of primordial elements (see Figure 3, a, c, d).

With regard to the phase of marked radiation aplasia, it must be stressed that, while pancytopenia was demonstrable in blood, in bone marrow there were active repair processes in the stroma and parenchyma, along with marked fatty atrophy. The quantity of clones of undifferentiated cells did not increase, but the number of cells per clone increased to a certain level (usually 50-200), after which visible differentiation thereof began.

If we consider that a colony of undifferentiated cells which, according to our conceptions, is a product of a stem cell, is the colony-forming unit of bone marrow (CFUm), we can apparently determine from the number of such colonies the quantity of remaining stem cells, as well as calculate the minimal level thereof involved in restoration of hemopoietic tissue. We tried to tentatively estimate the concentration of cells forming a clone in regenerative bone marrow. It ranged from 70 to 550/μℓ bone marrow with a radiation dosage of the order of 3-5 Gy.

As indicated by experimental and clinical data, the phase of regeneration is determined by proliferation of remaining or injected stem cells (Harris et al.; A. Ye. Baranov; Till and McCulloch; G. P. Gruzdev et al., 1974). On histological preparations (Figure 1, г), focal structure of bone marrow was demonstrable at the regeneration phase, and the volume of polymorphous parenchyma was related to examination time and radiation dosage. Recovery of hemopoiesis in bone marrow began about a week sooner than reflected in peripheral blood. As can be seen in Figure 3 (a, c, d), the curves describing the rate of recovery of erythroid and granulocytic hemopoiesis was about the same, indicating that the cell increment referable to both types occurred faster in the interval between the 10th to 18th-20th days than at subsequent times. This is probably attributable to differences in commitment and rates of divison of juvenile and mature forms of cellular elements.

The size of the erythroid and granulocytoblast compartment at the early stages of differentiation is determined by the quantity of undifferentiated cells. The fewer undifferentiated cells at the same examination, the lower primordial hemopoiesis (points 1, 2, 9 and 10 in Figure 3b corresponding to curves 1, 2 in Figure 3c; points 4 and 3 in Figure 3b correspond to curves 3, 4). According to all of the foregoing, undifferentiated cells migrate at the same rate from the pool of committed cells to the dividing-maturing pool. Just what causes the choice of commitment of undifferentiated cells to erythroid and granulocyte primordia remains unclear. In this respect, of interest are observations of the progress of the hematological syndrome in the presence of the severe form of acute radiation sickness. In such cases, regeneration of erythroid and granulocytic primordia begins at a later time (radiation dose to bone marrow ≥5 Gy) between the 11th and 20th days, which corresponds to a lower level of undifferentiated cells in these patients (points 5, 6, 7, 8 in Figure 3b correspond to curves 1, 2, 3 and 4 in Figure 3d). Recovery of the erythroid and granulocyte primordium of bone marrow with higher radiation level also occurred at a faster rate (see Figure 3d). This is consistent with the experimental data referable to granulocyte primordium (Ye. N. Shcherbova and G. P. Gruzdev).

However, such a pattern was not observed in all cases. In the cases of nonuniform radiation with extensive local radiation lesions to tissues, there was typical recovery of erythroid primordium with some lag in build-up of granulocytes and more marked macrophage reaction (see Figure 3d, curve 1). There were 10 times more macrophages in the case of radiation sickness without local lesions. Is this phenomenon due to transformation of committed cells of the macrophage type, or is there rapid migration of granulocytes to damaged tissues, are questions that have not yet been answered. It must be stressed that intensive reproduction of macrophages was combined with drastic increase in quantity of plasma cells.

Thus, according to our findings, the level of recovery of erythroid and granulocyte primordia of bone marrow is directly related to the initial quantity of undifferentiated cells. Examination of bone marrow from different parts of the body exposed to different doses of radiation revealed that its behavior was "autonomous" to some extent in response to lesion, which indirectly rules out migration of hemopoietic stem cells in man.

The complexity of the question of quantity of stem cells required for restoration of hemopoiesis in man is determined primarily by the fact that researchers do not usually have information about volumes of bone marrow exposed to some dose or other of radiation. There is no doubt that both the overall quantity of hemopoietic stem cells, which is determined entirely by dosage and degree of uniformity of irradiation, and apparently other causes determining the rate of commitment and differentiation of cellular elements of hemopoietic tissue affect restoration of hemopoietic function.

According to our data, it can be assumed that local necrobiotic changes in the skin and muscle tissue have an appreciable effect only on the condition of the granulocyte primordium and macrophage reaction of bone marrow, apparently determining the direction of differentiation of committed cells and, to some extent, altering the rate of repopulation and maturation.

PHOTO CAPTIONS

1. insert facing p 65

а) cellular depletion after 1 day (dosage 5 Gy); hematoxylin-eosin stain, magnification 40×5

б) accumulations of undifferentiated cells on the 20th day (4 Gy), magnification 10×7

в) the same cells at magnification of 90×7

г) polymorphocellular bone marrow on 43d day of sickness (dosage 3 Gy), magnification 40×7

BIBLIOGRAPHY

1. Baranov, A. Ye., Petrosyan, L. N., Pyatkin, Ye. K., et al., MED. RADIOL., No 8, 1977, pp 48-55.

2. Baranov, A. Ye., in "Radiobiologicheskaya konf. sotsialisticheskikh stran" [Radiobiology Conference of Socialist Nations], Varna, 1978, pp 25-25 [sic].

3. Bond, V., Fliedner, T., and Archambeau, J., "Mammalian Radiation Lethality. Impaired Kinetics of Cell Populations," Moscow, 1971.

4. Brilliant, M. D., Vorob'yev, A. I., and Baranov, A. Ye., in "Novoye v gematologii" [News in Hematology], Moscow, 1974, pp 37-49.

5. Vorob'yev, A. I., Brilliant, M. D., Baranov, A. Ye., et al., TER. ARKH., No 9, 1973, pp 85-93.

6. Vorob'yev, A. I., Baranov, A. Ye., Brilliant, M. D., et al., in "Stimulyatsiya i normalizatsiya krovetvoreniya pri luchevoy bolezni" [Stimulation and Normalization of Hemopoiesis in Radiation Sickness], Dushanbe, 1974, pp 3-6.

7. Vorob'yev, A. I., Chernega, G. V., Abdullayeva, V. M., et al., SOV. MED., No 3, 1976, pp 128-132.

8. Vyalova, N. A., Suvorova, L. A., Ivanova, T. A., et al., in "Vosstanovitel'nyye i kompensatornyye protsessy pri luchevykh porazheniyakh" [Recovery and Compensatory Processes in Radiation Sickness], Leningrad, 1979, pp 59-60.

9. Gruzdev, G. P., "The Problem of Damage to Hemopoietic Tissue in the Presence of Acute Radiation Pathology," Moscow, 1968.

10. Gruzdev, G. P., Monichev, A. Ya. and Shcherbova, Ye. N., in "Voprosy kibernetiki" [Problems of Cybernetics], Moscow, 1974, pp 64-103.

11. Gruzdev, G. P., Suvorova, L. A., Vyalova, N. A., et al., PROBL. GEMATOL., No 9, 1980, pp 41-45.

12. Gus'kova, A. K., and Baysogolov, G. D., "Human Radiation Sickness," Moscow, 1971.

13. Gus'kova, A. K., Drutman, R. D., Keirim-Markus, I. B., et al., MED. RADIOL., No 7, 1977, pp 64-72.

14. Moore, M. A. O., and Metcalf, M., PROBL. GEMATOL., No 10, 1973, pp 23-39.

15. Nesterova, V. I., Barabanova, A. V., Petushkov, V. N., et al., MED. RADIOL., No 11, 1980, pp 50-53.

16. Pyatkin, Ye. K., and Baranov, A. Ye., in "Radiatsionnaya biologiya" [Radiation Biology], Moscow, Vol 3, 1980, pp 103-179.

17. Strelin, G. S., "Regenerative Processes in Development and Elimination of Radiation Lesion," Moscow, 1978.

18. Till, D., and MacCulloch, E., in "Vosstanovleniye i reparativnyye mekhanizmy v radiobiologii" [Recovery and Repair Mechanisms in Radiobiology], Moscow, 1972.

19. Chertkov, I. L., and Vorob'yev, A. I., PROBL. GEMATOL., No 10, 1973, pp 3-23.

20. Chertkov, I. L., and Fridenshteyn, A. Ya., "Cellular Bases of Hemopoiesis (Hemopoietic Precursor Cells)," Moscow, 1977.

21. Shcherbova, Ye. N. and Gruzdev, G. P., RADIOBIOLOGIYA, Vol 17, 1977, pp 231-236.

22. Bloom, W. and Jacobson, L. O., BLOOD, Vol 3, 1948, pp 586-592.

23. Cronkite, E. and Bond, V., "Radiation Injury in Man," Springfield, 1960.

24. Harris, P., Haigh, O. and Kugler, S., ACTA HAEMAT. (Basel), Vol 29, 1963, pp 166-179.

25. Metcalf, M. D. and Moore, M. A. S., J. CELL PHYSIOL., Vol 78, 1971, p 441.

26. Moore, M. A. S. and William, N., Ibid, Vol 80, 1972, p 195.

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UDC 539.16.047:611/612

ANALYSIS OF SUITABILITY OF SOME ENZYMATIC TESTS TO ASSESS RADIATION INJURY TO SKIN

Moscow BIOLOGICHESKIYE NAUKI in Russian No 9, Sep 81 (manuscript received 15 Jun 79) pp 40-44

MATYUSHICHEV, V. B., KORNIKOV, V. V., TARATUKHIN, V. R., TIMOFEYEVA, O. Ye. and VERESHCHAGINA, Ye. M. (recommended by the Department of Biochemistry, Leningrad State University imeni A. A. Zhdanov)

[Abstract] Experiments were conducted on mongrel male albino rats (160 experimental, 64 controls) exposed to external beta radiation from ^{85}Kr in doses of 3, 4, 5, 6, 7, 8, 9 and 10 krad. DNAase and amylase activity of blood plasma and skin taken from the irradiated regions was measured and scaled to 1 mg protein from skin tissue or 1 milliliter blood plasma. The data were processed on a computer by means of factor analysis by the method of main components, and 8 parameters were considered: radiation dose, animal's weight, skin and plasma acid DNAases, skin and plasma alkaline DNAases, skin and plasma alpha amylases. The factor analysis method is described in detail. The results indicate that consideration of activity of all the above enzymes permits a complete determination of severity of skin lesions due to beta radiation, and the implications of this finding are discussed. References 5 (Russian).
[20-10,657]

HUMAN FACTORS

EFFECTIVENESS OF LABOR IN SCIENCE

Riga NAUKA I TEKHNIKA in Russian No 9, Sep 81 pp 24-25

KUDINOV, OLEG Institute of Philosophy and Law, Latvian SSR Academy of Sciences
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[Abstract] Increase in numbers of scientific workers in the Soviet Union is the result of the enhanced social and economic status of scientists but is also limited when individuals who do not possess the inner qualities needed for scientific work are attracted into science. Hence, the need exists for ways of assessing the quality and quality of work done by individuals. Various ways of approaching this problem are discussed and criticized. It is concluded that the problem can be solved only on the basis of a differential approach, that is, by using different criteria when evaluating the work of scientific workers in different dsiciplines. It is suggested that this differentiated approach can be made on the basis of the qualifications of individuals. A classification is attempted to distinguish paired groups (the level of group qualifications and appropriate methods for evaluating the work done by a given group), using, as the main categories, trainees, "young scientists," "scientists at the height of their powers" and "highly reputed scientists." Figure 1 (photo of author); no references.
[24-9642]

PSYCHOLOGY

SOCIAL PSYCHOLOGY'S CONTRIBUTIONS TO WORK IMPROVEMENT

Leningrad VESTNIK LENINGRADSKOGO UNIVERSITETA: EKONOMIKA, FILOSOFIYA, PRAVO in Russian No 11, Issue 2, Jun 81 (manuscript received 14 Jan 81) pp 58-62

[Article by A. L. Sventsitskiy and I. P. Volkov: "The 26th Congress and Some Social-Psychological Research Issues in Industry"]

[Test] The basis for planned, systematic social-psychological research in our country's industry was laid by psychologists from Leningrad University under the leadership of Academician B. G. Anan'yev and his students Ye. S. Kuz'min and A. A. Bodalev in the 60's. During this period, the research goals were a scientific validation of the Leningrad Party Organization's idea on developing a theory and methods for planning enterprise work group social development, an idea which was approved and supported at the 23rd CPSU Congress. In subsequent years, the practical experience from concrete sociological and social-psychological research in developing procedures for socio-economic development in industry gained widespread recognition. In addition, the training of qualified social psychologists at the university made it possible to include them in the industrial engineering groups, offices and laboratories, and departments of industrial enterprises, which facilitated the development of a new research trend in the field of industrial social psychology.

At present, social-psychological research in industry is being conducted on a broad front in order to enhance the organization of work and management. The successful implementation of psychologists' recommendations at the Leningrad associations Svetlana, Pozitron, Kozitskiy, the Kirov Plant and others, enjoys a great deal of popularity. Social psychologists are studying such problems as the formation of a communist attitude toward work, personnel turnover, instruction, methods and ways of organizing socialist competition, the socio-psychological climate of work groups, work discipline and safety, the specialist's adjustment to the enterprise, training and psychological assessment of management personnel.

The goals set by the 26th CPSU Congress decisions--the future development of the national economy, acceleration of scientific and technological progress, shifting the economy toward intensification, more efficient utilization of the country's industrial potential, all-out conservation of all types of resources and improved job performance--

are making new, high demands on social psychologists' research in industrial enterprises. It is extremely important that the scientists' primary efforts be concentrated on uncovering an industry's internal reserves in the area of the "human factor." A scientific approach to the study of the socio-psychological features of individual and group job performance is becoming especially urgent.

In the CPSU Central Committee's Keynote Report to the 26th party congress, L. I. Brezhnev emphasized that the conditions under which our national economy will develop in coming years make the acceleration of scientific and technological progress even more pressing. To a significant extent, the additional development of socio-psychological research in industry is caused by the expanded mechanization and automation of work processes, the reduced percentage of manual labor and the increased share of mental labor, the intensified industrial specialization and concentration and the appearance of larger and organizationally more complex industrial enterprises (firms and associations). The processes of intensive economic development are causing no less intensive shifts in the work organization of industrial groups by requiring improved performance, standards, incentives, socialist competition, etc. Because of this, the study and practical consideration of socio-psychological phenomena--such as job satisfaction, group member compatibility and harmony, the group's socio-psychological climate, leadership style, etc.,--will facilitate more successful accomplishment of the goals set by the 26th CPSU Congress for the 11th Five-Year Plan: increasing the efficiency of social production.

The engineering, technological and organizational innovations which are being carried out in our enterprises on a widespread basis are causing a number of social and socio-psychological changes in industrial groups and are having an effect on the development and manifestation of the individual's psychological traits. Equipment modernization, the introduction of new procedures and the reorganization of an enterprise's divisions--each of these innovations, upon touching the individual employee, is reflected in the characteristics of his on-the-job (and frequently off-the-job) performance and it gives rise to a specific subjective attitude toward innovations in him. This attitude can have a large range of diverse shades--from the individual's unconditional acceptance of the specific innovation to active opposition toward it.

Industrial efficiency is greatly dependent upon how rapidly and adequately employees react to changes in equipment, technology, organizational structure or management methods. The employee's attitude toward a specific innovation itself and all the accompanying circumstances is also very important here. Thus, the problem of employee adjustment to various innovations at an enterprise turns out to be exceptionally important. Consequently, there is a practical goal of managing this adjustment process in order to optimize implementation of innovations. As shown by social-psychological research data, the optimal approach for implementing innovations should include not simply the advance identification of employee attitudes toward concrete innovations but also systematic "cross-sections" of these attitudes at each stage of the reorganization.

The contemporary period of communist development in our country is characterized by a continually increasing role for worker groups, especially in tangible production. In his report on the USSR's primary economic and social development trends at the 26th CPSU Congress, N. A. Tikhonov noted: "Efficient socialist management is inconceiveable without relying upon the group, without inculcating a truly proprietary attitude toward the job and toward economic standards and without each person's superior job performance."[1]

The important role of work groups in our society has been legislatively incorporated in the USSR Constitution, Article 8 of which states: "Work groups take part in the discussion and resolution of state and public affairs, in planning production and social development, in training and assigning personnel, in discussing and resolving the problems of enterprise and establishment management, of improving work conditions and living conditions and of using the assets intended for industrial development as well as those for social and recreational events and for economic incentives.

"Work groups develop socialist competition, promote the dissemination of advanced work methods and the improvement of work discipline, mold their members in a spirit of communist morality and see to the improvement of their political awareness, cultural and occupational qualifications."[2]

The broad powers granted to the socialist work group--which is not only our society's economic nucleus but also its social nucleus--obligates social psychologists to direct their efforts to a study of the phenomena and processes taking place in it. As the research data shows, the interrelationships which develop between people in the work group and how the individual feels about himself in the group determine both his attitude toward work and his perception of the surrounding environment. A favorable social-psychological climate greatly facilitates the development of an optimistic attitude overall and it sets a positive emotional background; and this is exceptionally important in the campaign to improve labor productivity and product quality and it promotes successful education of people. This is why the daily performance of the administration, party, labor union and Komsomol organizations at enterprises should be examined by considering the industrial and socio-political goals set for our society.

Within the framework of the social-psychological problems of socialist work groups, the research on team types of work organization deserves special attention; accomplishment of the 26th CPSU Congress goals which require increased industrial efficiency from internal sources and reserves is directly dependent upon the introduction of these types of work organization. In the social-psychological respect, the development of team types of work organization also touches upon the problems of employee incentives, their individual and group productivity and the criteria for evaluating each employee's contribution to the group product. "Our system of tangible and intangible incentives should always guarantee a just and objective evaluation of each employee's work contribution everywhere," said L. I. Brezhnev in the CPSU Central Committee's Keynote Report to the 26th party congress. "It is necessary to provide incentives for conscientious employees in every way possible and it is necessary not to leave any loopholes for loafers or poor workers to have a good life for worthless work."[3]

If the discussion is about the practical return that utilization of social-psychology's recommendations could have, it is necessary to point out that this return is the greatest where scientific and industrial activities are integrated, where engineering and technological innovations are developed and where they are effectively put into production--at scientific-production associations. Therefore, it is not by accident that the country's major associations have sociologists and psychologists working in the industrial engineering department; they are doing applied research to improve work efficiency and to educate group members.

The association is a new type of socialist enterprise whose organizational structure optimizes the accomplishment of the economic and social goals facing it. The association has a complex, all-embracing organizational and production structure which includes research and production divisions and, because of this, it has great socio-economic potential based on total cost accounting and the integration of science and production. These traits of associations create an environment to conduct social-psychological research and experiments directed at studying the general and particular relationships for group work organization depending upon the level of difficulty of goals being accomplished, the creative nature of the work, group norms, current psychological barriers against introducing innovations, etc.

As shown by the experience in social planning at Svetlana, Pozitron, LOMO and other associations, the effectiveness of technical and economic measures implemented to improve work efficiency depends upon how well they match procedures in the social sphere. For example, in drawing up the social development plan at Pozitron Association, they conducted a study of the personality traits of managers of scientific groups and production groups, which made it possible to optimize the balance of interactions between these classes of employees in the production process and also made it possible to determine the requirements for a standard set of traits for an effective scientific and production division manager.

An important place among social planning measures has been teaching managers the fundamentals of social psychology and the art of teaching relative to their activities. Recently, the training program has more and more actively included business scenarios. These procedures are developed by social psychologists at Leningrad University and other scientific centers. The use of these games makes it possible to achieve a swifter and psychologically more effective adjustment of the manager's personality to the requirements of the socio-industrial situation and to the expectations of subordinates and superiors; it facilitates an adjustment of his self appraisal and personal managerial abilities; it improves his management style and methods; and it reduces the possibility of mistakes in perceiving and understanding the environment. The group manager is viewed by our social psychologists primarily as the subject of management. However, it is obvious that a comprehensive analysis of management problems should definitely include a conception of the manager not just as the subject but also as the object of management. Future research should reliably answer the question of the effect exerted on the manager by other managers, superiors and subordinates. Such studies will also make it possible to extend our understanding of the social-psychological aspects of managerial decision-making.

We virtually do not study the social-psychological problems concerning a level of management like a sector of the national economy. The problem of optimizing the social-psychological aspects of communications within a sector is of immense importance. Properly informing workers can facilitate accomplishment of many important goals: the inculcation of a group spirit and a sense of responsibility for objectives, the recognition by each employee of the social importance of his work, and others. Good management of communications up the line within a sector is an important component for molding public participative management. The successful functioning of an entire sector is also greatly dependent upon how effective lateral communications between representatives of various organizations are.

At present, the interest in social-psychological research in industry is enormous. A larger and larger number of scholars are engaging in this work; managers are falling back on social psychologists recommendations more and more frequently. The practical activities of work groups raise more and more questions for researchers every day. Another important goal of the social psychologist is to formulate these questions in the language of science and to search for and find ways of solving them. The introduction of social psychology into industrial practice is directed at optimizing the management of work groups and, in the final analysis, it promotes realization of the 26th CPSU Congress decisions.

FOOTNOTES

1. PRAVDA, 28 Feb 1981.

2. The USSR Constitution (Basic Law), Moscow, 1977, p 8.

3. PRAVDA, 24 Feb 1981.

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PSYCHOLOGY'S ROLE IN ENHANCING LEGAL CONTROL

Leningrad VESTNIK LENINGRADSKOGO UNIVERSITETA: EKONOMIKA, FILOSOFIYA, PRAVO in Russian No 11, Issue 2, Jun 81 (manuscript received 14 Jan 81) pp 63-67

[Article by B. D. Lyskov: "Psychological Problems of Legal Control in Socialist Society"]

[Text] Within the complex system of legal controls being implemented by the state and public organizations, it is possible to single out a number of areas where utilization of the advances in contemporary psychology and where application of the methods of scientific psychological research would promote increased effectiveness of these controls.

One of these areas is the study of psychological principles for developing a sense of justice. The goal of molding a sense of justice in the members of socialist society is an integral part of all the party and state's multi-faceted activities to develop a new man, to affirm the socialist way of life. I is only socialist society that is characterized by a profound moral substantiation of all the principles and requirements of legal norms and by the integrated effect of both legal and all other social norms of objective reality (economic, political, ethical and others)[1] on personality development. This fact establishes a favorable environment for the process of the personality's assimilation of specific legal requirements, i.e., obtaining information about them, and it has developed into the process of molding the personality's convictions, forming the structure of its value orientation. At the same time, this environment is not sufficient for all members of society to automatically internalize the execution of the requirements of legal norms. As shown by the results of concrete studies conducted in a number of the USSR's oblasts and union republics, only slightly more than half of those polled (55.5 percent) responded that they obey laws for reasons of agreement with them or active approval of them. A significant number of those surveyed pointed to "the custom of obeying established rules" as the reason for their lawful behavior, while about 4 percent indicated a fear of sanctions, a fear of unfavorable consequences.[2]

So, with their unanimity on the society's ideological and political goals, part of the members of socialist society show a definite disparity between their knowledge of concrete legal norms and the level of their conviction in the need to follow these norms. The discovery of psychological mechanisms for transforming legal norms into effective behavioral controls, a more precise definition of the concrete mechanisms for developing the individual's sense of justice and the determination of the feasibility of controlling these processes can evidently be accomplished only through concrete legal-psychological research. The urgent goals of such research are to uncover the reasons for the ineffectiveness of legal publicity and to search for ways of individualizing methods for developing a sense of justice depending upon specific personality traits.

The psychological studies of the processes of developing the individual's sense of justice in the young generation are topical and promising. The experience from similar studies[3] shows the complexity and inconsistency of these processes. Even with the relatively integrated development of the teenager's system of values, interests and needs, a certain lag can be observed precisely in the evolution of the controlling role of a sense of justice, a lag which is based, for example, on the inadequacy of the individual's self-appraisal, on the idea of personal uniqueness, of not being subject to conventional, "routine" standards. The results of similar research would promote a study of more effective methods of psychological adjustment and real information among "difficult" teenagers. There is a need for further study of the issue of the personality's legal traits,which have basically been framed in terms of methodology for now.[4]

Another important area of psychological research in the interest of legal control is, in our opinion, the in-depth study of personality traits and the mental state of people who have committed particular offenses. While the Soviet science of criminology rejects the idea of a "born criminal" and while there is no reason to concur with the assertions about the presence of specific traits in the offender's personality which unavoidably cause criminal behavior, it does not at all follow from this that a psychological analysis of the pattern of a criminal's personality and of standard criminal situations is doomed to be unproductive from the outset. It is precisely on the basis of individual psychological research and not just social-psychological and socio-demographic research that I believe it is extremely important to obtain a clear idea of what personality traits and character traits are correlated with a disposition to carry out certain vital collisions in a manner which is incompatible with legal norms and to view to what extent they correlate. The currently available experience from such research testifies to their undoubted promise. Preliminary data from the comprehensive psychological and medical study of a group of offenders conducted by me in conjunction with T. A. Nemchin and A. K. Nitchenko show that the results of an individual psychological analysis of an offender's personality combined with an evaluation of the entire range of the individual's relations with his surrounding social microcosm can promote increased effectiveness of concrete and individual steps to prevent illegal behavior. Moreover, it was found that the controlling role of a sense of justice as an important component of personality is manifested in the complex, contradictory struggle of motives and needs and that the effect of this factor on human behavior can fluctuate significantly in the emotional strain of a concrete conflict situation.

A solution is required to the problem of more effective psychological support for investigative processes and legal proceedings. The feasibility of using the methods of scientific psychology in the practical work of legal investigative agencies is beyond doubt. The specific goals of legal investigative agencies and the requirement for scrupulously matching the principles and methods of any psychological research with the requirements of the procedural standards of Soviet legislation eliminate the possibility of a simple transference of the common research procedures for general psychology to legal application. The good results from work in this area are based on works by A. R. Ratinov, M. M. Kochenov, V. L. Vasil'yev, A. V. Dulov and others.[5] A number of fundamental ideas on these issues were expressed by M. S. Strogovich.[6] The issue of the need for specialist training in forensic psychology and, specifically in forensic psychological expertise, has already been raised.[7]

As is well known, a major principle of legal control is the principle of the inevitability of punishment; it is undoubtedly of major educational significance. However, in Soviet legislation, this principle is inseparably linked to the requirement of individualized punishment, to the need for considering the personality traits of the individual who committed the crime and the specific facts of the case. Essentially, each of the problems arising here is primarily a legal problem; however, it also has a significant psychological aspect. This primarily concerns consideration of the defendant's personality traits. It is obvious that a full-fledged psychological analysis of personality traits, including the defendant's personality, can only be discussed if scientific psychological research methods are used. It is hardly realistic at present to frame the issue so that the personality of each person brought up on criminal charges is studied by a psychologist at a professional level; however, the fundamental legitimacy of this proposition is beyond doubt. The range of psychological issues emerging in legal proceedings and requiring resolution by forensic psychological examination will steadily expand in the interest of effective judicial sanctions in the interest of increased educational importance of each judicial sentence.

In the court and investigative employees' psychology of work, there is a realistic and feasible goal of studying the processes forming the judge's inner conviction of the defendant's guilt (degree of guilt). As is well known, the law attaches primary importance to this factor in pronouncing a well-founded, just sentence.[8] However, the problem of the principles for the judge's processing and evaluation of the enormous amount of data on the defendant's personality and on the facts of the case, the data which is required to form an inner conviction, has hardly been studied by scientific psychological methods. Also of great interest is the issue of the judge's personality traits and their effect on the process of forming an inner conviction. The result of such research could be used for the professional improvement and selection of judges.

The continuing process of humanizing and improving Soviet justice promotes the goals of determining the effectiveness of particular acts creating norms. For example, the widespread application of suspended sentences for minors raises the problem of determining the criteria of effectiveness for this measure. Legal-psychological research could, on the one hand, serve as the basis for recommendations on individualized punishment and, on the other hand, it would promote a more accurate definition of the educational importance of this trend on teenagers with unstable behavior and a propensity toward offenses. Our limited experience working with this category of offenders does not allow us to consider as unwarranted the proposition that the news on the widespread application of suspended sentences is perceived by a certain number of minors as almost a guarantee of no punishment ("it's okay, you won't be put away the first time"). The pressing nature of legal-psychological research in this area is evident.

An entire range of psychological and legal-psychological problems requiring study arise in the practical legal control of people with various neural-psychological deviations which fluctuate between normal and pathological and which do not rule out responsibility. It should be pointed out that we are talking about able-bodied, legally competent members of society who are formally full-fledged objects and subjects of the law. Valuable research experience on the legal importance of borderline mental anomalies has been accumulated by forensic psychiatry. It is appropriate to recall that, for example, the very concept of psychopathology is obligated to the practice of forensic psychiatry for its appearance to a decisive degree. However, the process of accumulating knowledge on the legal importance of particular neuro-psychological traits of these people is presently proceeding in definite isolation from their practical application. Forensic psychiatrists are naturally concentrating their primary attention on a more accurate definition of the criteria of responsibility-irresponsibility for various conditions of mental illness and essentially do not participate in the additional, post-examination implementation of the principle of individualized punishment. The information on the personality and characterological traits of the person examined and found to be of sound mind is not always completely considered by the court. One of the reasons for this situation is the fact that the psychological criteria for an individualized assessment of the defendant's individual personality traits do not have clear legal equivalents for setting punishment.[9] At present, there are no precise prerequisites for making concrete suggestions to improve the law for taking more detailed and well-founded consideration of the defendant's individual personality traits and mental condition. We cannot agree with those who believe that this task is exceptional in its complexity. However, the urgency of the task is so significant, in our opinion, that it is difficult to recognize any further delay with the development of widespread legal-psychological research as being warranted.

Sentencing is only one of the initial links in the process of implementing the principle of individualized punishment. As is well known, significant corrections to the punishment set by the sentence are made while the sentence is being served (changes in security, early parole, etc.). Psychological support for monitoring the effectiveness, i.e., making recommendations based on the results of a scientific psychological analysis of the convict's socialization is the subject and goal of the psychology of corrective labor.[10] In principle, a prerequisite for every decision by the authorities to change the punishment set by the court should result from an individual psychological study of the convict's personality. Possible objections to this formulation of the problem can obviously consist of the fact that psychological research data should not predetermine the issue of changes in punishment and researchers should not go beyond the bounds of their authority and try to undermine proper legal authorities.

The response to such objections has already been provided by the practical experience of forensic psychological expertise which testify to the fact that the examination does not take on the function of the court and does not undermine it when issues are properly formulated by expert psychologists and when the responses to them are in the proper form.[11]

In addition to conducting individual psychological research in corrective labor institutions, there is the extremely urgent problem of optimizing the psychological climate in various convict groups, of normalizing the relations between them and of preventing possible undesirable or even harmful consequences from the environment in the small group on the convict's personality. The range of such problems requiring concrete psychological research for their solution is extremely broad.[12]

An important area of legal-psychological research is the study of the psychological aspects of rehabilitation for people who have served their sentences, the discovery of specific causes of criminal recidivists and the study of recommendations to prevent them.

In our opinion, we have only covered the more urgent psychological problems related to the need for further improvement of the legal control processes in a developed socialist society. The requirement for an in-depth scientific justification of any measure touching upon the interest of the members of a developed socialist society was reflected with new forcefulness in the 26th CPSU Congress proceedings. One of the ways of implementing this requirement is through expanded research with the methods of contemporary scientific psychology in the interest of improved legal relations in socialist society.

FOOTNOTES

1. Lukasheva, Ye. V. "Sotsialisticheskoye pravosoznaniye i zakonnost'" (A Socialist Sense of Justice and Legality), Moscow, 1973; Prokrovskiy, I. F. "Formirovaniye pravosoznaniya lichnosti" (Development of the Individual's Sense of Justice), Leningrad, 1972.

2. "Lichnost' i uvazheniye k zakony: Sotsiologicheskiy aspekt" (Personality and Respect for Law: The Sociological Aspect), Moscow, 1979.

3. Dolgova, A. I. "Pravosoznaniye i ego defekty u nesovershennoletnikh pravonarushiteley" (The Sense of Justice and its Defects in Youthful Offenders), Moscow, 1972; Alemaskin, M. A. "A Psychological Description of an Offender," in the book "Voprosy preduprezhdeniya pravonarusheniy" (Problems of Preventing Offenses), Moscow, 1965, 2nd ed.

4. Platonov, K. K. "The Problem of Traits in Legal Psychology" in the book "Materialy Vsesoyuznogo s"yezda psikhologov SSSR" (Proceedings of the National Congress of Soviet Psychologists), Tbilisi, 1971.

5. Ratinov, A. R. "Sudebnaya psikhologiya dlya sledovatelya" (Forensic Psychology for the Investigator), Moscow, 1967; Kochenov, M. M. "Vvedeniye v sudebno-psikhologicheskuyu ekspertizu" (Introduction to Forensic Psychological Examination), Moscow, 1980; Vasil'yev, V. L. "Yuridicheskaya psikhologiya" (Legal Psychology), Leningrad, 1974; Dulov, A. V. "Sudebnaya psikhologiya," Minsk, 1975.

6. Strogovich, M. S. "Certain Issues of Using Psychology in Jurisprudence," PSIKOLOGICHESKIY ZHURNAL, No 6, 1980.

7. Lyskov, B. D. "Current Problems of Forensic Psychology," VESTNIK LENINGR. UN-TA, No 5, 1979.

8. Groshevoy, Yu. M. "Problemy formirovaniya sudeyskogo ubezhdeniya v ugolovnom sudoproizvodstve" (Problems Forming Judicial Opinions in Criminal Proceedings), Khar'kov, 1975.

9. The exceptions are crimes committed in a state of physiological affect or sudden, strong mental agitation caused by force, aggravated assault or other illegal actions of the victim which degrade individual honor or dignity.

10. Glotochkin, A. D. and Pirozhkov, V. F. "Ispravitel'no-trudovaya psikhologiya" (The Psychology of Corrective Labor), Moscow, 1974.

11. "Issues of Forensic Psychological Expertise: An Anthology," Moscow, 1978.

12. Ibid.

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BASIC DIRECTIONS OF SCIENTIFIC RESEARCH CONDUCTED BY LENINGRAD STATE UNIVERSITY PSYCHOLOGY FACULTY DURING 11TH AND 12TH FIVE-YEAR PLANS

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[Text] The historical decisions of the 26th CPSU Congress and proceedings of this congress pertain to all aspects of development of our society. A special role in economic and social development is assigned to Soviet science, "which should constantly 'disrupt tranquility,' showing where things have slowed down or become static, and where the current level of knowledge makes it possible to advance faster and with greater success."[1]

The "Main Directions of Economic and Social Development of the USSR in 1981-1985 and up to 1990," indicate: "The role of science must be promoted in the area of creating the material and technical base of communism and solving pressing social problems.... There must be improvement of effectiveness of scientific research and significant reduction of time of introduction of scientific and technological advances into industry." For this purpose, it is imperative to "improve coordination between scientific institutions, to provide for advancing development of basic research and augment the value of applied research. There must be strengthening of the material and technical base of scientific research, research planning, design organizations and VUZ's."[2]

The proceedings of the 26th CPSU Congress devote special attention to such an important area of human endeavor as labor, improvement of working conditions and providing for highly productive creative work. It is repeatedly stressed in these proceedings that reduction of increment in manpower resources is one of the factors that makes economic development more difficult. "Under the conditions prevailing in the 1980's, a careful and economic attitude toward manpower resources acquires special importance. This is a complicated matter, which requires solving many economic, technological, social and educational problems."[3] The concrete theoretical and practical problems that psychologists must solve ensue from all of the foregoing.

In 1980, the Psychology Faculty worked on 86 scientific research topics, 62 of which were completed; 27 were worked on by economic agreements with various organizations and enterprises.

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*Translator's note: Article actually ends on p 63, not provided, which lists footnotes and date manuscript was received.

One of the most important directions of scientific work done by the Chair of General Psychology is structural and genetic investigation of man as an individual and personality, i.e., individuality. In this regard, we should mention such studies as "Somatic and Psychophysiological Organization of Man" (G. I. Akinshchikova), "Research on Sensitivity as a Property of Human Sensory Organization" (L. N. Kuleshova), "Psychological Aspects of Formation of the Personality of a Soviet Specialist" (I. M. Paley). With reference to the last mentioned topic, a theoretical and experimental study was conducted of factors that enhance the efficacy of psychological and pedagogic influence on the process of formation of the personality of a Soviet specialist, and concrete practical recommendations were offered on how to organize the educational and rearing process on the basis of consideration of the student's individuality.

As a result of the work on "Investigation of Effectiveness of Perception of Audio Information as Related to Different Performance Conditions" (L. V. Oginets), there was experimental validation of a dichotic method of delivering acoustic information to a subject, which is based on testing the specifics of man's binaural hearing. Use of this method of delivering information improves the efficiency of processing thereof by 15% with minimal technical expenditure. The results of scientific research by the Chair of General Psychology obtained theoretical generalization from the standpoint of the systems analysis approach, which is being developed under the guidance of Prof A. A. Krylov, head of this chair.

Among the projects completed by the Chair of Engineering Psychology, we were impressed by "Investigation of Problems of Mental Reflection" (V. A. Ganzen), in which two methods of integration and systematization of psychological information were developed. The results of the study conducted by T. P. Zinchenko of the effectiveness of receiving and processing bimodal information by man led to formulation of a number of practical recommendations on how to organize the work of an operator and optimize the performance of equipment for display of visual and auditory information.

The "Study of Some Sociopsychological Distinctions of Primary Work Groups in the 'Pozitron' LNPO [Leningrad Scientific Production Association]" (A. Yu. Shalyto) was pursued by the Chair of Social Psychology. Some new data were obtained, which make it possible to adjust the psychological climate in groups on a scientific basis, as well as to offer validated recommendations on certification of administrative personnel, improve work pertaining to stimulation of work motivation and optimum use of work time.

I. S. Chugunova obtained the fullest sociopsychological description of the personality of engineers holding different positions in accordance with the examination program developed in "Experimental Use of Sociopsychological Methods for Testing the Personality of Design Office Engineers." Recommendations were elaborated on the basis of obtained data in order to improve the effectiveness of certification of engineers and improve work with personnel.

The problem of higher education was the main direction of work by the Chair of Pedagogics and Pedagogic Psychology. In 1980, the staff of this chair under the guidance of Prof N. V. Kuz'mina, head of the chair, worked on several extremely important scientific research projects dealing with investigation and elaboration of general principles of pedagogics and psychology of higher schools, investigation of methodological problems of pedagogic science, prospects of development of higher school psychology and pedagogics.

Complex studies of the causes of student dropouts were pursued under the guidance of Prof A. A. Krylov, faculty dean, together with other chairs of this faculty. Determination was made of pedagogic, psychological and social dropout factors related to the level of prior education and self-organization of studies, motivation and orientation of students, distinctions of the student group as the closest social environment that a student enters.

In recent years, increasing attention has been given to introduction into practice of the results of the faculty's scientific research projects, which occurred either at the base of the requesters of economic agreements for research, or in institutions and enterprises linked with the Psychology Faculty by contracts for creative collaboration. The results of scientific research are introduced into practice in the following forms: 1) Issuance of concrete recommendations for altering the system of professional training of controllers; organization of vocational guidance work, improvement of sociopsychological climate on the job, etc. 2) Conducting joint studies, joint analysis of data, preparing programs of psychohygienic vocational guidance work. 3) Consultations organized for rank and file personnel or administrative workers of institutions in order to introduce, into the practical work of institutions and organizations, methods for psychological testing; upgrading organization of labor, methods of preventing traumatism; disseminating psychological information about the patterns of workers' mental activities, psychologically proper organization of labor.

In 1980, the system of scientific research at the university was reorganized, and the scientific research part of Leningrad State University was formed. Accordingly, a department of psychology was organized in the faculty, which consists of four sections: experimental and applied psychology, engineering psychology, social psychology, pedagogic psychology and pedagogics. However, these sections are rather large scientific formations, which do not permit singling out the entire diversity of scientific problems with which the Psychology Faculty is or should be concerned. The faculty pursued scientific organization work to define the main subject matter of the sections and, chiefly, to establish within the sections (on a voluntary basis) 17 scientific laboratories with their own more specialized scientific problems. The entire set of problems that are the concern of the sections and laboratories was determined by the logic of scientific development of psychology and objectives advanced for economic and social development of our society and, in particular, tasks contained in the proceedings of the 26th CPSU Congress.

In the "Main Directions of Economic and Social Development of the USSR in 1981-1985 and up to 1990," it is stated that it is imperative to "provide for advancing development of basic research and increasing the productivity of applied research." Work on methodological and methodical principles of the systems analysis approach to the study of man as an individual, personality and subject of work is being pursued at the Psychology Faculty as an independent scientific problem. This scientific direction is the theoretical basis of all psychological studies pursued in this faculty. There are also plans for research in the following directions: individual psychological traits of man; development of general and professional abilities; mental regulation and mental processes; intelligence, thinking, communication; psychological mechanisms of decision making.

The largest laboratory with regard to personnel (about 75 people) was created on a voluntary basis to solve the above-mentioned basic and applied problems.

Research that is mainly of a basic nature is closely linked to the studies pursued in the laboratories of psychophysics and measurement methods, which are being developed for investigation of dynamic and structural characteristics of sensory and perceptive processes, metric psychophysical grading of sensations, perception and emotions, ways and means of measuring psychophysical characteristics.

Two aspects can be distinguished in human individuality: social and biological. The Psychology Faculty plans to conduct studies in the field of man's innate foundation as an independent scientific direction. To some degree, these studies go beyond the framework of traditional psychological research and include elements of individual biological distinctions of man in general. Expressly this approach to the study of man (problem of anthropology) developed in the works of the founder of the Leningrad school of psychologists, B. G. Anan'yev. In this regard, it is important to make an in-depth study of neurodynamic and constitutional characteristics of man, energetic and information mechanisms of regulation of processes of man's vital functions, distinctions of temperament, inclinations and distinctions of man's psychosensorimotor organization, refinement of methods of diagnosing psychophysiological states and phylogenesis of human needs.

In the works of B. G. Anan'yev, there was broad development of the idea of studying man as the subject of labor, subject of activity, which should be the subject of close investigation in the independent scientific laboratory of "Psychology of personality and activity." The main topics for this laboratory are: psychological factors of achievement of personality; characteristics of personality as the subject of activity, formation of the main personality traits in ontogenesis and life; realization of the personality's potential in the structure of activity, motivational bases of regulating activity.

The problem of social adaptation and prevention of unlawful behavior is an important scientific and practical direction of studying personality, and it includes the following range of questions: analysis of distinctions of formation of conditions for unlawful and antisocial behavior; structural distinctions of personality and temperament of different groups of convicted people, studies of distinctions of juvenile law-breaking and crime, development and refinement of methods of forensic psychological expertise.

In the report of the CC CPSU to the 26th Party Congress, it is stated that "Soviet society is a society of working people."[5] However, the nature of work does not stay unchanged in a fully developed socialist society. The labor of a modern worker is growing in its intellectual content. For this reason, the main scientific direction of psychological research related to problems of labor will be the theoretical and methodological principles of complex investigation and optimization of work in order to improve the efficiency and quality of labor, humanization thereof. Here, we could single out a number of psychological problems, which are not being presently studied to the same extent by far by the Psychology Faculty.

Least studied are psychological problems related to new types of professional work, such as man's work in dialogue systems, working with texts in professional work, verbal communication in man-machine systems (MMS). Several problems have been under study by this faculty for many years, such as the study of psychological factors of efficiency of professional performance, investigation of man's states during work, etc.

There is a separate group of problems related to factors of reliability of man's performance in MMS. We refer to the psychological mechanisms upon which reliability is based, including personality factors, factors of professional training, reliability of performance under extreme conditions.

At the present time, planning of activity emerged as an independent direction of reserach in engineering psychology. It includes investigation and evaluation of existing types of activities, simulation of various professional forms of activity and actual planning of both individual and collective types of activities. This direction of research also involves solving problems of humanizing labor, problems that are inherent only in a communist society. With regard to problems of industrial psychology and engineering psychology, we can single out those that are traditional for the work on this faculty: problems of information reception and processing by an operator, including polysensory information.

Optimization of sociopsychological processes and phenomena in worker groups is the main scientific direction of the department of social psychology. The sociopsychological research conducted there is acquiring much importance due to the profound collective nature of modern labor. The main object of investigation and practical application of obtained data is the primary work group, control of which involves solving the following sociopsychological problems: development of methods of overcoming psychological causes that prevent introduction of technological, technical and organizational innovations; influence of organizational communication on efficiency of the primary industrial group; sociopsychological factors of industrial adaptation of young workers; sociopsychological training of industrial administrative personnel; prevention and regulation of work conflicts.

It is stated in the report of N. A. Tikhonov: "There must be comprehensive implementation of growth of social and work activity of the Soviet people and deployment of socialist competition."[6] Sociopsychological aspects of socialist competition and brigade [team] forms of work can be justifiably combined into an independent scientific direction including the following: principles of organization of socialist competition; effect of individual and group forms of socialist competition on the psychological climate in a group and efficiency of labor; sociopsychological factors of effectiveness of spiritual and material incentives; optimization of psychological climate with team forms of work as a factor of improving efficiency of production; sociopsychological adaptation in groups; mass information media and introduction of progressive forms of labor and socialist competition. Expressly these sociopsychological investigations are called upon to "intensify ethical training, develop a communistic attitude toward labor and public property."[7]

In the proceedings of the 26th CPSU Congress, much attention is devoted to work with personnel. Sociopsychological studies in the area of methods of testing and training personnel should be pursued in the following directions: study of effective methods of evaluating and training engineering-technical and administrative personnel; forecasting professional performance of specialists; determination of requirements for certification of personnel of industrial enterprises and organizations.

In the area of pedagogic psychology at the faculty, the main scientific direction for the next few years will be to investigate cognitive activity, formation of the specialist's personality and determination of factors for improving the efficacy of the educational and training processes in various pedagogic systems.

In the report of L. I. Brezhnev to the 26th Party Congress, he discussed the unquestionable achievements of the Soviet system of higher and secondary specialized education. However, the report noted that "the main thing today is to upgrade education, vocational and ethical upbringing in schools, eradication of formalism in evaluating the results of the work of teachers and pupils, strengthen the link between education and life, improve training of school children for socially useful labor."[8] For this reason, the primary object of investigation of the Department of Pedagogics and Pedagogic Psychology will be pedagogic systems of higher and secondary specialized education. In the area of industrial pedagogics and pedagogic psychology, the following ways and means of introducing them into practice will be developed: active training of political education lecturers, brigade leaders, instructor-foremen, pedagogues and teachers at PTU [vocational and technical schools]; high-speed methods of determining group and individual evaluations and mutual evaluations in industrial and educational groups; effective teaching and evaluation methods in advanced training of workers in industry, VUZ's and PTU.

In the general theoretical respect, it is planned primarily to organize and conduct a number of studies in the area of development of methods and forms of controlling the educational process in different pedagogic systems.

The problem of influence of organizational and individual-personality factors on effectiveness of various pedagogic systems will be solved by conducting research in the direction of studying the structure of professionally important personality traits of the pedagogue; style and level of pedagogic thinking; systems of professional pedagogic training; structure of professional pedagogic ethics.

The set of problems related to educating and training foreign students at the VUZ's of our country is a relatively new, but rather important area of psychological pedagogic research at the present time. For this purpose, it is necessary to study the contingent of foreign students from different parts of the world, their socio-psychological adaptation to the educational and training process in a Soviet VUZ; psychological pedagogic and scientific methodological bases of Soviet reality for foreign students; psychological pedagogic bases and organization of individual and group training work.

Expanding the topics, particularly in accordance with State budgeted scientific research work, with concurrent elimination of duplication and parallelism of problems studied, is an important factor in planning scientific research by this faculty for the next 5 years. Thus, instead of the 59 topics on the State budget worked on in 1980, it is planned to work on 32 in 1981, without narrowing the range of scientific directions and with increase in responsibility of scientific administrators for timeliness of selected problems and introduction of obtained results into the practice of the national economy. The planned psychological research requires solid and comprehensive material and technical support with regard to experimental equipment, instruments, special acoustic and electrophysiological chambers with output on electronic computers. Expressly this task is put to the Laboratory of Engineering [hardware?] (LTO) of the faculty, which was formed by engineering personnel from different chairs. VUZ and tekhnikum students are periodically called upon to work in the LTO as they undergo practical training and engage in preparing for their diplomas under the guidance of qualified engineering and technical personnel on the faculty.

A pressing task for the computer center of the faculty related to the proposed scientific research is to work out methods for automated experiments, introduction thereof into virtually all areas of psychological scientific research, as well as into the practice of laboratory classes dealing with specialized study courses. Of course, this requires serious improvement of the material and technical base of the faculty and conversion of the faculty's computer center into a modern computer complex constituting the base for software [mathematical support] of psychological services of Leningrad. In this regard, the "Draft of an automated control system for the educational process and scientific research," as well as a plan for introduction and operation of the automated control system in 1981-1985, were elaborated by the faculty. This 5-year plan of development of computer technology by the Psychology Faculty was directly reflected in the content of the different stages of the long-term (1981-1985) topic of "Automation of Scientific Research and Use of Computers in the Educational Process," proposed by the Cost Accounting Association of the RSFSR Minvuz [Ministry of Higher and Secondary Specialized Education?] and Far-East Branch of the USSR Academy of Sciences. Within the framework of developing this topic by the faculty, it is planned to create a computer complex based on Ye. S. [unified system] and SM [expansion unknown] computers (IVK-2) to support the educational process, scientific research and management of the faculty as a whole.

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